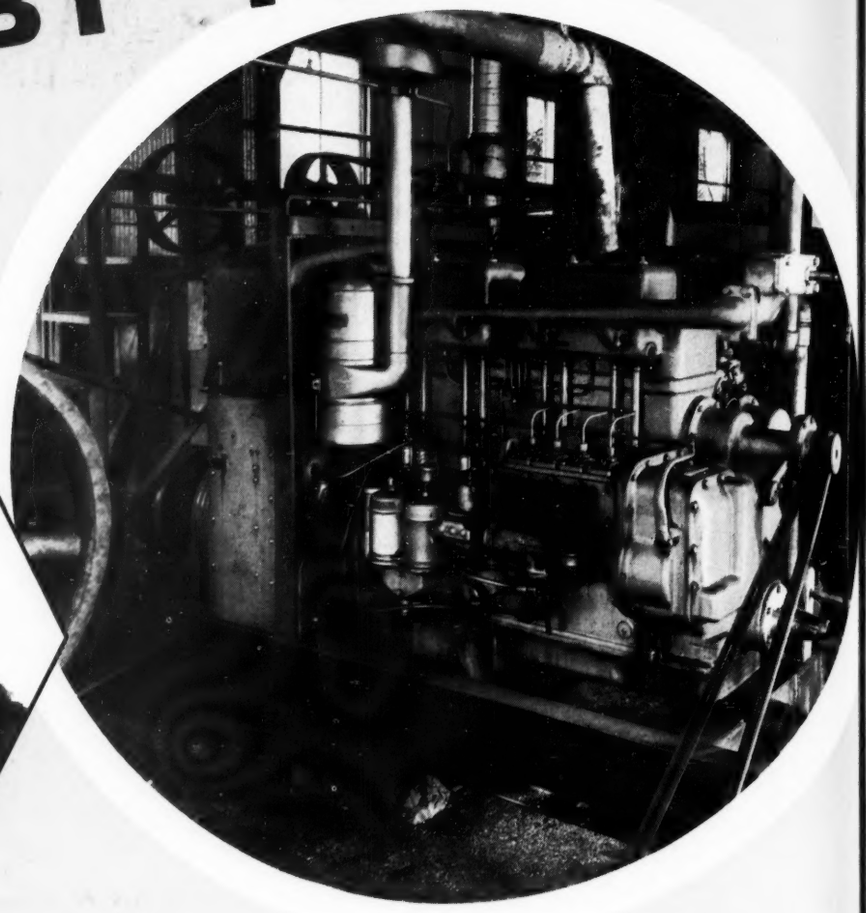
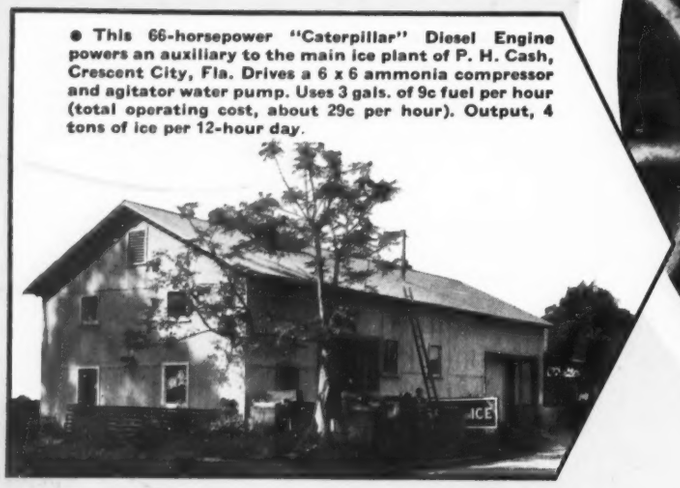
FOOD INDUSTRIES

NOVEMBER 1938

HOMES OF FAMOUS FOODS . . SWIFT'S POULTRY AND DAIRY PRODUCTS, SEDALIA, MO.

STANDING OFF THE "STAND-BY" PROBLEM





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FOOD INDUSTRIES

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Contents for NOVEMBER 1938

VOLUME 10, NUMBER 11

Food Technology

New Discoveries and Inventions

Packaging
Food Tin Enamel 647

Food Engineering
Damaged Milk Bottles 647
Filtering Beverages 647

Bakery Products
Cake Baking 647

Beverages
Low-Sugar Beers 647

Canned Foods
Canned Foods a Century Ago 662

Dairy Products
Determining Foreign Matter in Cheese 662
How Butter Differs from Margarine .. 662

Dehydrated Foods
Pectin Protects Yeast During Drying .. 663

Flour Milling
Conditioning Wheat 663

Meat Products
Paper Sausage Casings 664
Liver Extract for Anemia 664

Raw Produce
Improved Fruit Packing 665
Spotting of Figs on the Market 665

Miscellaneous
Unripe Coffee Beans Lack Flavor 665

★ *Homes of Famous Foods*

On the cover of FOOD INDUSTRIES this month is pictured the Sedalia, Mo., plant of Swift & Co., one of some 100 plants for the production and distribution of Brookfield butter, eggs and cheese, and Swift's Premium poultry.

THIS MONTH

PROCESSING

Room for Greater Safety 616

Freezing Methods Evaluated 618
By J. G. Woodroof

Freezing With Multi-Stage Tubular Freezers—Part I 622
By W. J. Finnegan

Pasteurizing at 57th Street 625
By H. S. Van Bomel

Proposed New Food and Drug Regulations 628

Consumers Will Pay for Quality 630

Rigid Quality Control Makes Mixes Good 633
By L. E. Dietrich

Home Economists—A Letter 636
By A. L. Macleod

DISTRIBUTION

Unreached Markets for Bakery Products—A Letter .. 632
By V. C. Kylberg

Locker Plants for Storing Frozen Foods—Part II ... 637
By I. C. Miller

New Packages and Products 642

Merchandising Hints and Hurdles 643

Truck Body Provides Different Temperatures 644

Paint Shop Operation Pays—Sometimes 646

DISTRIBUTION FEATURES

Food Pages That Will Appear in December Women's Magazines 638

EVERY MONTH

Talk of the Industry 613
Automotive Section 644
Plant Notebook 648
Food Equipment News ... 649
Catalogs 651
The Food Industry News . 652
Business Trends 655
Men, Jobs and Companies 657
Book Notes 666
Patents 666

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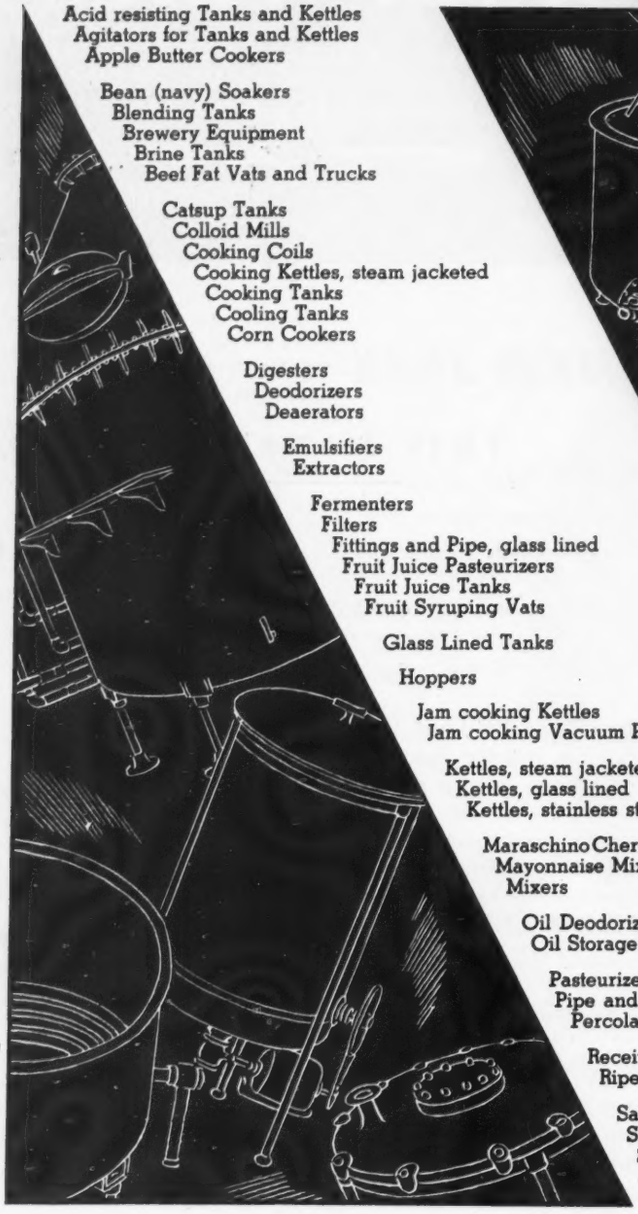
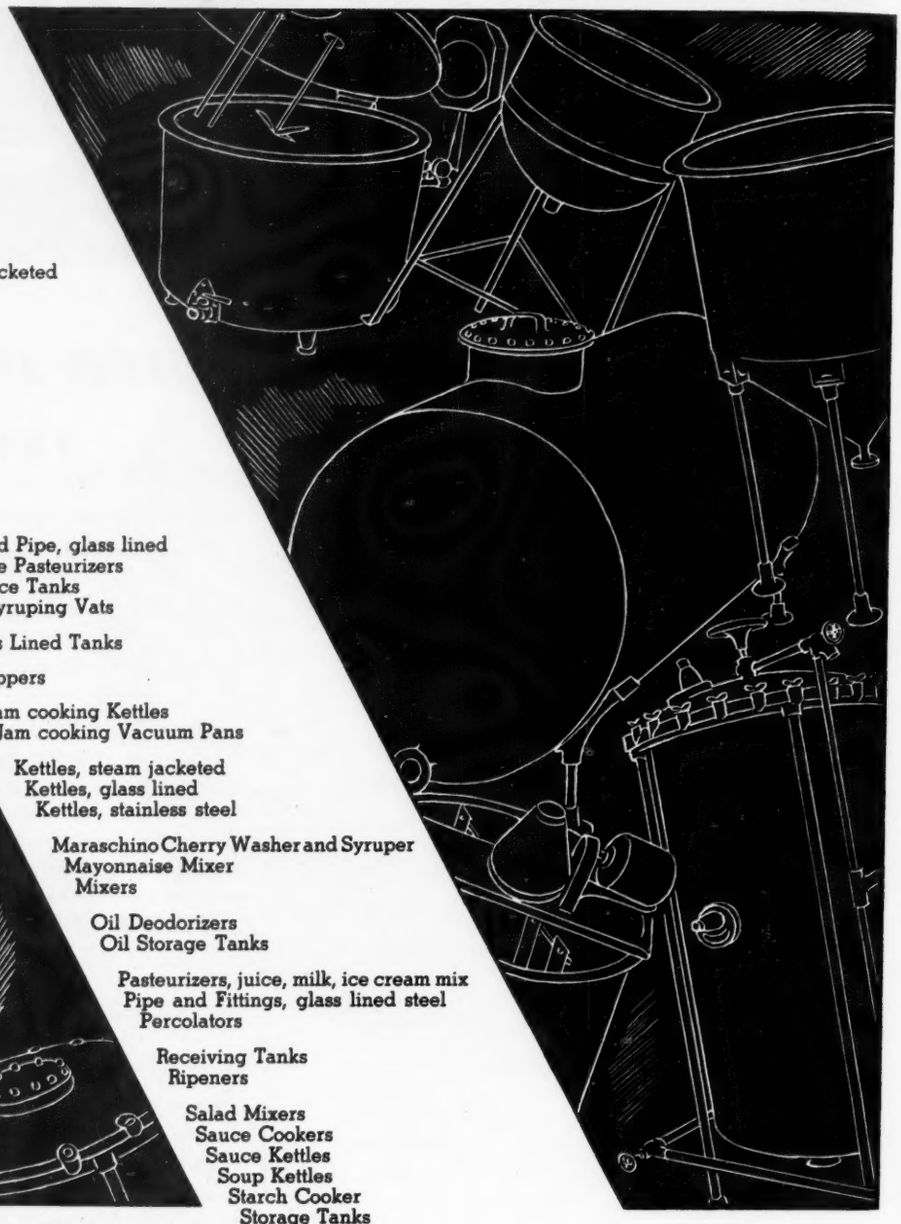
GLASS-LINED STEEL OR STAINLESS STEEL





Acid resisting Tanks and Kettles
Agitators for Tanks and Kettles
Apple Butter Cookers

Bean (navy) Soakers
Blending Tanks
Brewery Equipment
Brine Tanks
Beef Fat Vats and Trucks

Catsup Tanks
Colloid Mills
Cooking Coils
Cooking Kettles, steam jacketed
Cooking Tanks
Cooling Tanks
Corn Cookers

Digesters
Deodorizers
Deaerators

Emulsifiers
Extractors

Fermenters
Filters
Fittings and Pipe, glass lined
Fruit Juice Pasteurizers
Fruit Juice Tanks
Fruit Syruping Vats

Glass Lined Tanks

Hoppers

Jam cooking Kettles
Jam cooking Vacuum Pans

Kettles, steam jacketed
Kettles, glass lined
Kettles, stainless steel

Maraschino Cherry Washer and Syruper
Mayonnaise Mixer
Mixers

Oil Deodorizers
Oil Storage Tanks

Pasteurizers, juice, milk, ice cream mix
Pipe and Fittings, glass lined steel
Percolators

Receiving Tanks
Ripeners

Salad Mixers
Sauce Cookers
Sauce Kettles
Soup Kettles
Starch Cooker
Storage Tanks
Syrup Mixers
Syruping Tanks

Tanks, glass lined
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Tomato Cookers
Tomato Paste Pans
Truck Tanks

Vacuum Pans for Preserves, Juices, etc.

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FOOD INDUSTRIES

DISTRIBUTION • PROCESSING

Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 10, No. 11

Laurence V. Burton, Editor

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NOVEMBER 1938

The Talk of the Industry

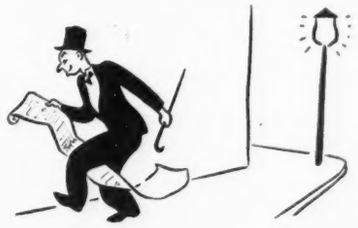
» NORMALLY about ten or twelve days elapse between closing date and mailing date for this department of FOOD INDUSTRIES. During that brief period the world crisis over Czechoslovakia arose, tottered, subsided. Which breath-taking event only leaves us with a firm conviction that the Sudeten Germans will soon find out that they sold themselves down the river.

» SPEAKING OF WAR, it would be a very healthy activity for all food manufacturers to give considerable thought to their plans in the event of a first-class war. Events of late September indicate very clearly that the next war can be expected to break out all over the land without much advance warning. The food manufacturer's rôle in provisioning large armies will require some carefully thought out plans if they are to succeed with a minimum of muddling.

» HONEY, according to the U.S. Department of Agriculture, is one of the few agricultural products of which there is practically no surplus carry-over from the 1937 production. With an estimated annual production of 160,000,000 lb., the fact that it all went into consumption in twelve months is something of an achievement. Fortunately for the honey manufacturer, the output of honey can not be doubled in a year.

» BUSINESS MEN who cry out against the trend of events in this country toward a more completely managed economy, and at the same time demand that the Federal Surplus Commodities Corporation should relieve them of unsalable inventories, had better do some pretty solid thinking in the very near future. For in that direction is the road to "production for service only"—call it by any ism you choose. If business continues to demand this development in this way, it will probably come: there are about 13,000,000 other people—all voters—who are of like mind.

» A few years ago, one of those astonishing and impossible calls for help came to FOOD INDUSTRIES from a student of home economics. She asked for literature references on the subject matter of an essay she was about to write—an essay on The Science of the Future. (Note that it was not on the future of science). Such a quest as a science of things-to-come seemed so irrational that she was advised that the subject was a good one to be dropped into the waste-basket. But that now appears to have been a gross mistake, for recently a mathematician has taken chaos and brought mathematical order into it to



the extent that he can compute the future course of a staggering drunk. Which seems to be a good imitation of a science of the future.

» ANY EQUIPMENT pertaining to the use, processing or dispensing of milk or cream must inevitably come under the purview of lynx-eyed inspectors of municipal health departments. Knowing this, it is always a source of wonder as to why such inferior engineering is so often incorporated in its design. Recently a small gadget for dispensing whipped cream was ruled out by one health department for the simple reason that it could not be taken apart for cleaning.

» "TO ANYONE who has watched the wheat market closely in the last few years," said Secretary of Agriculture Wallace in a recent speech at Hutchinson, Kan., "the fall in the price is not a surprise. It was bound to come with the return of ordinary weather."

Fair enough. But just a few days later there is the distressing report of the Great Plains Committee, predicting certain crop failures and recurring despair for the Dakotas, Western Minnesota, Northern Nebraska and Northeastern Wyoming.

The committee thinks these sections should return to cattle raising. Which would seem very intelligent, especially as there is seldom enough rain to make a crop, and "normal weather" elsewhere pushes the price of their crops too far down, that being a wheat country, if, as and when they can raise anything.

BUT—reports from North Carolina, and certain other states in which the soil erosion activities of Mr. Wallace's far flung army operate, are to the effect that too much hay is being raised. That promises—assuming federal soil erosion payments are continued—that in a year or two more Mr. Wallace may be saying "anyone who has watched the cattle market closely will not be surprised" that the

farmers are losing money on cattle.

About that time we hope to print an editorial to the broad general effect that "no one who has watched carefully the efforts of government bureaus to control nature will be surprised" to learn that it's a tough job.

But there is always the "ever normal granary."

» On Oct. 1, 1938, Food Industries was ten years old. But everyone hereabouts was so busy that the date passed by without attracting our attention any more than it did yours.

More "Co-ops"

The cooperative movement is growing in many fields. Especially among agricultural interests, there is a constantly increasing development of organizations for both purchasing and selling on a cooperative basis. This trend may have an important significance for food manufacturers, just as it has for other marketers of goods in the rural areas of America.

The experience of fertilizer marketers should be noted in this connection. Some of the firms who used to sell only through dealers or direct to farmers thought that they would have nothing to do with farm groups purchasing in cooperative fashion. That proved to be quite a mistake. Other companies accepted such orders—in fact went out after them. Those who would have nothing to do with the co-op movement found themselves without customers in important areas where previously they had done much business.

Food industry marketers may have a like experience if they neglect the growing number of agricultural purchasing co-ops. They offer a splendid field for processed food because, strangely enough, farmers wives buy more canned goods and other manufactured food products than the typical town housewife, who is alleged to cook only with a can opener.

We Believe in Trade Associations, But—

From time to time we are consulted about the possibilities of forming trade associations in the food field. Sometimes we are invited to participate in their formation.

Our policy is to keep out of any such activities where they are promoted by outsiders. There are many such gentlemen who promote associations to create jobs for themselves, but we will not be a party to this form of enterprise.

Food Industries believes in trade associations when they are formed and operated for the benefit of the members. But we will not lend our aid except by specific invitation from bona fide members of the industry involved. The association that is formed by outsiders to collect dues to pay themselves a salary savors of something that we dislike exceedingly.

How to Avoid Being a Stuffed Shirt

Insulation from contact with those who hold views that differ from our own may carry with it a penalty that sometimes manifests itself in most awkward places. It comes out at crucial times, such as during a hearing before a Congressional committee, in a dispute before a labor board, or in other public places where something akin to stage-fright or a complete inability to meet the issue is appallingly evident.

In public debate, the sheep are sharply differentiated from the goats, the stuffed shirt is suddenly and pitilessly exposed if he does not know all the answers. Whether one's views are conservative, radical, liberal or middle-of-the-road, they should be subjected to innumerable vicious private debates before partaking in public debate or even an appearance before a public official.

As has been noted before, wide reading and a liberal education are a great asset to the men who are trying to solve today's trying problems. But Captains of Industry also need to

Hors d'Oeuvres

• Ever hear of "yoghurt?" It's Bulgarian sour milk, which probably is just like American sour milk except that our cows haven't been frightened by Hitler. Anyway, the British use it to make "yogfruit," a blend of yoghurt and fruit syrup. The concoction is put up in wide-mouthed glass containers and dispensed at milk bars, where it is poured into wide-mouthed containers with shoes on.

• *A company in Topeka, Kan., freezes horse meat. But don't let it worry you. The meat is shipped abroad.*

• If you eat fish once a week according to the Friday tradition, how long will it take you to sample each of the varieties of fish and shellfish produced commercially in this country? Three years and four weeks. There are 160 varieties. No more complaints, please, about monotony in the American diet.

• *Someone discovered that vitamin B is effective in mitigating the morning-after effects of too much alcohol. So ginger ale containing 100 International units of the vitamin in each bottle is being marketed by Hiram Ricker & Sons, So. Poland, Me. But if this ginger ale prevents a hangover, what's to remind you of the swell time you had the night before. Oh! you don't want to be reminded.*

• Clarence Francis in a recent speech gave newspaper editors a pat on the back for their interest in public welfare. He called upon them to "goad us, exhort us, inspire us, shame us, entertain us, challenge us, enlighten us. And more power to your elbow!" But why more power to the elbow? One stein at a time is enough, even for newspaper editors.

• *At the turn of the eighteenth century, the British were experimenting with "portable soup." In cake form it was prepared from meat broth by evaporation. Sir John Pringle described it as follows: "having by long boiling evaporated the most putrescent parts of the meat, is reduced to the consistence of glue, which in effect it is, and will like other glues, in a dry place keep sound for years together." Hope it tasted better than sounds.*

• A baby oyster looks something like a microscopic thimble with a hairy belt around the middle. After a highly active existence of about fifteen days, it drops to the bottom of the water, finds itself a nice, clean shell or rock, expels a jet of cement-like substance, rolls over, presses its shell into the adhesive material and becomes attached for life. It feeds on microscopic plants and organic matter, filtering as much as 26 quarts of water an hour through its gills to get its food. In two to five years, it is ready to eat. The oyster harvest is about 11,700,000 bu., valued at $5,000,000 to fishermen and supplying 63,000,000 lb. of food. No other article of diet compares with the oyster in food value, it being rich in minerals, vitamins and protein. Hereafter, treat the oyster with the respect due it.

• *Looking for a food business in which you get paid for the raw material you use? Then set yourself up a rattlesnake canning plant in Pinellas County, Florida. Since 1935, the county has paid out in snake bounties $10,333 on 5,787 rattlers and 1,562 coral snakes. And rattlesnake meat sells at $1.50 for a tiny can.*

• American-cured hams are popular in Scotland—probably because they have little shrink.

F.K.L.

sharpen their wits by private arguments—real arguments with real opponents, not straw men. A group of business men lamenting and abusing the New Deal is no preparation for a verbal skirmish with an ardent New Dealer. Your little business man will almost always make a better showing than a big business man because the former is in closer contact with the realities.

Let's Use Trained Minds

GOOD PROCESSING is daily becoming more complicated, more in need of exact control. Competition between commodities, as well as between makers of the same commodity, necessitates low cost and superior quality with never-ending attention to detail.

All this imposes a new burden on the food executive and the plant superintendent. These men cannot hope to be everywhere that skilled supervision is required. The very complexity of modern processing demands the delegation of more responsibility to junior executives, and relatively inexperienced operating men. Dependability and carefulness are no longer enough at many key posts. Real skill, backed by a trained mind that knows *why* as well as *how*, seems necessary.

One result of developing complexity in processing is going to be a demand for more highly trained men, including many with college training in the sciences and in engineering. Such men have long been recognized as necessary for the research department and for direction of control laboratories. They are becoming increasingly necessary for supervision of operations and the development of processes all through the works.

Colleges are beginning to recognize this need and are training more food technologists. These young men, if of proper personality and character, will be invaluable in the food industries. Not all of them will make good on their first try. But it may be just as unfortunate for the boss if he doesn't learn how to use skilled minds as well as skilled hands, as it may be temporarily unpleasant for the young man who finds himself a missfit on his first food plant job. In the case of the ineffective manager, he may be out of the industry permanently. In the case of the young man, if he is worth while, he will find another job where he can use his talents well. Use of this talent will require patience and tact on the side of both. But the profit for both is sure, so the effort will be well worth while.

Wage-Hour Committee—Soon

SHORTLY there will have to be an industry committee for the food business under the Fair Labor Standards Act. Administrator Andrews will have to designate a representative group from employers, employees, and the public to pass on those questions for which his office must have outside recommendations before making official rulings. Most important of the jobs before such a committee will be a determination of whether anything more than 25 cents may soon be imposed as a minimum wage. The committee will also classify employment within the food business to assist it in fixing several wage minimums, if these seem desirable.

The immediate concern of food manufacturers should be a determination of the definition of the food industry. The Administrator does not wish a large number of separate committees, one for each of the divisions of our great business. But it is not clear whether every kind of food manufacturing which is affected by the law will be put into a single group. It may be so done, but there has been no decision in that matter as yet. In fact, the Administrator will probably be largely guided by the wishes of the industry itself in deciding how broad a definition shall govern, so long as the industry does not come in with a whole lot of little groups each desiring separate attention.

Among other things, on which such an industry committee will assist the Administrator, will be matters of classification, including presumably the classification of those divisions of the food business whch shall be defined as seasonal.

Although no such committee is likely to be named for two or three months, it is not too soon for representatives of each branch of food manufacturing and processing to prepare suitable information and advice for the Administrator with respect to the scope and character of this committee work.

Research Laboratory Needed

RESEARCH WORK on improvement of malting types of barley has been under way for some time under the direction of plant breeding experts of the University of Wisconsin and the United States Department of Agriculture. But up to now there has been no complementary activity by the brewing industry to set up some means of giving actual commercial tests to the new varieties of barley.

Plainly such a testing laboratory is going to be much needed in a very short time. The brewers will require a well-equipped research laboratory and pilot plant if they are to derive much real benefit from crop improvement work. For without a pilot plant in which to conduct tests, the utility of the new varieties will be left for haphazard experience to determine. Which is not conscious progress.

An industry-owned and industry-directed research laboratory is an imperative need. It is impossible for a plant breeder to determine the suitability of any variety for manufacturing purposes without putting the grain to an actual test.

Echoes of Elixir Sulfanilamide

THE OLD FOOD AND DRUG LAW—the Act of 1906—still has teeth in it, despite the frailties that made a new law necessary. Under the old law, the manufacturer of Elixir Sulfanilamide was fined $150 on each of 112 counts, many of which resulted in deaths. (Insurance companies generally regard a life as worth $5,000.)

In this series of fatalities, the solvent—not the drug itself—which made the elixir so deadly was diethylene glycol. This is a synthetic organic chemical which had not been adequately tested out for human consumption.

But lest the food industries turn up their respective noses in disdain for a pharmaceutical manufacturer who made so lamentable a mistake, attention is directed to current Notices of Judgement, Food and Drug Administration. In one issue of this unsavory record, the following products are listed. (All of them contained the same sort of stuff that resulted in the heavy death toll from Elixir Sulfanilamide):

Assorted flavors, food and beverage flavors, imitation vanilla flavor, imitation lemon flavor, imitation fruit flavor, vanilla, imitation butter flavor, banana flavor, "food solvent," raspberry, pineapple and wild cherry essences, imitation rum flavor, imitation apple flavor, black walnut flavor, and artificial glycerin. Many of the foregoing cases are cited by the Government as alcohol substitutes in flavors. Which suggests that the absurdly high tax on pure ethyl alcohol is responsible for driving food manufacturers to seek for less costly substitutes. But even that does not absolve the manufacturer of the synthetic solvent or its users from failure to make the proper tests of a new material before offering it for human consumption.

Room for GREATER SAFETY

Food industries fail to keep pace in accident prevention

SEVERITY RATES FOR INJURIES in the food industry have increased steadily since 1932, until the average rate is now 12 per cent above 1926. The industry did much better, however, in respect to frequency of accidents, the 1937 rate being 33 per cent below that for 1926. But compared to that in other industries, the accident trend for the food field is unsatisfactory. During the past eleven years there has been an improvement of 61 per cent in frequency of accidents and of 42 per cent in severity for all industries. These facts are revealed by the 1937 accident report of National Safety Council.

Leading among the agencies of accidents in the food industries is machinery, which was involved in 38 per cent of all cases. Rolls figured in more accidents than any other type of machinery, with centrifugals, mixing machines and cutting machines being of next importance. Trucks, automobiles and other vehicles were involved in 12 per cent of all accident cases, and were next in importance to machinery. Other agencies mentioned frequently in accident reports were boilers and pipe and pressure apparatus, hand tools, ladders and working surfaces.

One-third of all serious accident cases were assigned to the mechanical cause, "hazardous arrangement." Unsafely stored or piled materials and unsafe working and operating methods were important factors in the mechanical causes of accidents in 1937. A bag handler, for example, suffered a shoulder injury because the proper method of removing bags from a pile was not followed.

Improper guarding was charged to 25 per cent of the serious injuries. For example, an employee suffered a permanent partial disability to two fingers when his hand came in contact with the running gears from which the guards had been removed while moving the machine.

Defective agencies, such as unsafe design of machines, poor construction and worn or broken equipment, was listed as the cause of 15 per cent of all injuries. There is the case of the employee who was applying "dope" to a belt which was guarded but which slipped continually because of inadequacy for the work. This luckless fellow lost an arm when he was caught between the belt and the pulley.

▶ A necessary step in any public relations program is to look after the physical and mental well-being of employees by providing good working conditions (FOOD INDUSTRIES, October, page 602). Good working conditions include a safe place for employees to spend their hours of labor. So any public relations program must include safety work. That there is room for improvement in safety in the food industries is demonstrated by the statistics in this article.

PUBLIC RELATIONS IN THE *Food Industries*

Unsafe dress or apparel also figured in a significant number of serious injuries, lack or non-use of goggles being the principal cause of this type. Other accidents were due to loose clothing being caught in machinery.

Wrong attitudes on the part of employees were charged against almost 60 per cent of all serious injuries, thereby heading the personal causes of serious accidents. Disregarding instructions was by far the most frequently mentioned. Recklessness was given in many reports, and some accidents were due to the employees "working in an abstracted manner." Inexperience and unawareness of safe practices were personal causes in 28 out of 130 cases. This cause was assigned more often to accidents involving new employees, although it was also charged to accidents resulting in injuries to old employees. The ignorance of a supervisor of how to pile bags of material properly was one case of unawareness that resulted in serious injury to an employee. Of the 130 serious injuries, only three involved physical defects of the employees.

"Caught in or between" was the outstanding type of serious accident, resulting in 55 per cent of all serious injuries. Such accidents occurred most often when employees got their fingers and hands caught between parts of moving machinery. The next important type of accident was falling, sliding and flying objects, this being involved in 15 per cent of all cases. Of the 1937 reported injuries, two employees lost the sight of one eye when struck by flying objects. Foot injuries due to falling objects also were common.

In listing the outstanding facts about the 1937 injury rates in the food industries, National Safety Council reported the figure for frequency at 16.79 and that for severity as 1.24, these data being based upon reports from 416 organizations whose employees worked 249,101,000 man hours during the year. The figures for all industries are 13.85 and 1.58 for frequency and severity, respectively. The food industry ranked 20th in frequency and 15th in severity in a list of 30 major industries. The industry's 1937 frequency rate is 3 per cent above the 1936 rate and the severity rate is up 7 per cent. These increases compare with no change in frequency and a reduction of 2 per cent in severity for all industries.

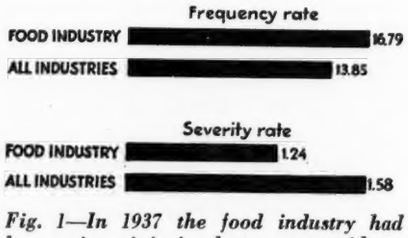


Fig. 1—In 1937 the food industry had less serious injuries but more accidents than all industries.

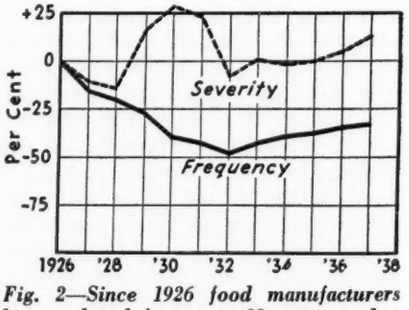
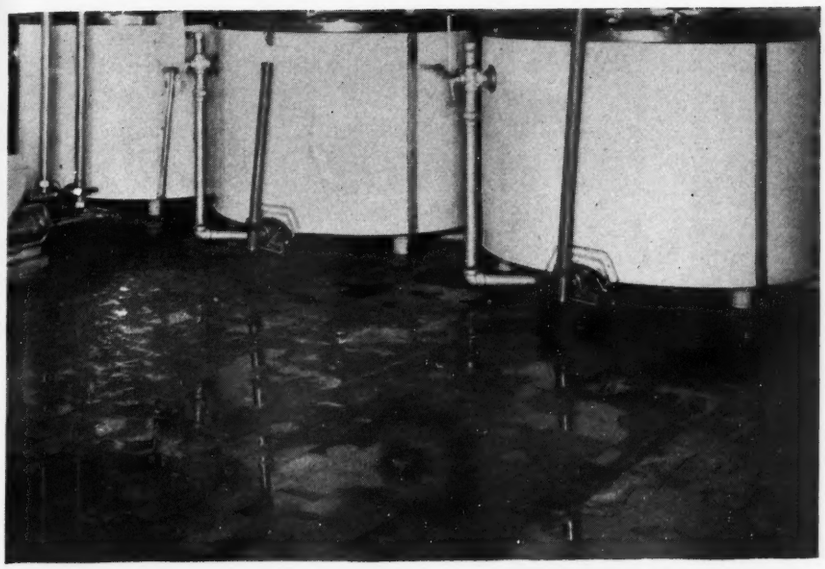


Fig. 2—Since 1926 food manufacturers have reduced frequency 33 per cent but severity is 12 per cent higher.



Falls represent an important percentage of the accidents in food plants. Wet, slippery floors cause many of these falls. Plant sanitation requires washing down at frequent intervals, so food manufacturers should select floor materials that are not unduly slick when wet.

The rise in the industry's 1937 frequency rate over that of 1936 is due largely to an increase in the frequency of temporary disabilities. Of the more serious type of injuries, permanent partial disabilities decreased but fatalities increased in frequency. The rise in the frequency of fatalities accounts most for the increase in the industry's severity rate since 1936.

As a testimonial to well-planned and executed safety programs, the large organizations in the industry showed the best 1937 accident records, averaging 16.48 for frequency and 0.96 for severity. Small units had a rate of 19.07 for frequency and 2.58 for severity.

Bakeries had the lowest frequency rate among the food industries, averaging 10.54. Frequency rates were highest in the dairy industry and the unclassified group of food industries, being, respectively, 23.99 and 31.03. Severity rates were highest in plants manufacturing beverages, averaging 3.25.

Plants manufacturing corn products made the largest reduction in frequency from 1936 to 1937, the drop amounting to 15 per cent. Canning and preserving plants, together with manufacturers of miscellaneous food products, had the best reduction in severity—35 per cent. Frequency rates rose sharply in confectionery and miscellaneous food products plants, and large increases in severity occurred in beverage and cereal plants.

The best all time no-injury record in the food industry was established by Peter Cailler Kohler Swiss Chocolates Co., Inc., Fulton, N. Y. This company worked 3,904,841 man hours without injury. Next best was Kellogg Co., Battle Creek, Mich., with 1,159,776 man hours. Other food companies cited for excellent no-injury records include: Atlantic Sugar Refineries, Ltd., St. John, N. B.; Crosse & Blackwell, Inc., Baltimore; Ralston Purina Co., Nashville; Bowman Dairy Co., Columbia Ave. plant, Chicago.

In addition to these companies, National Safety Council named the following plants for outstanding safety achievements during 1936: Loose-Wiles Biscuit Co., Boston; Ward Baking Co., Pittsburgh; Continental Baking Co., Jersey City, N. J.; Bennett-Hubbard Candy Co.; Clinton Co.; Canadian Postum Co., Ltd.; Ralston Purina Co., Davenport, Iowa; Sperry Flour Co., Portland, Ore.; Christian Feigenspan Brewing Co.; National Sugar Refining Co. of Edgewater, N. J.; Godchaux Sugars, Inc.; General Mills, Inc.; Kraft-Phenix Cheese Co., Jersey City; Cloverleaf Harris Dairy; McCormick Sales Co.; and C. E. Sauer & Co.

Table I — Accident Trends by Industry (1936–37)

Industrial group [1]	*Change in frequency (per cent)*	*Change in severity (per cent)*
Entire Industry	3	7
Corn products	−15	−12
Dairy products	− 9	27
Sugar refining	− 8	−12
Canning and preserving	− 3	−35
Milling	− 3	3
Beverages	2	267
Bakeries	5	−29
Cereal manufacturing	11	40
Other food products	24	−35
Confectionery	84	25

[1] Hotels and restaurants omitted.

Table II — Accident Trends by Type of Injury

	All injuries	*Death and perm. total*	*Perm. partial*	*Temporary*
1937 Frequency rate	16.79	0.09	0.70	16.00
1937 Severity rate	1.24	0.54	0.41	0.29
Change in frequency, 1936 to 1937	+3%	+29%	−10%	+3%
Change in severity, 1936 to 1937	+7%	+29%	−12%	+8%
Change in frequency, 1926 to 1937	−33%	+72%	−32%	−34%
Change in severity, 1926 to 1937	+12%	+72%	−26%	−16%

Table IV — Relative Importance of Accident Causes (Based on recent one-year reports from Illinois, New York, Maryland, New Jersey and Pennsylvania)

Type of accident	*All industries (per cent)*	*Food industry (per cent)*
All types	100.0	100.0
Handling objects	25.9	28.9
Falls to a different level	8.7	8.1
Falls to the same level	9.5	12.8
Machinery	12.0	14.3
Vehicles	10.9	9.6
Using hand tools	7.6	5.3
Falling objects	8.7	3.8
Stepping on or striking against objects	5.6	6.0
Electricity, explosives, heat	3.6	4.3
Harmful substances	2.1	2.1
Other	5.4	4.8

Table III — Accident Picture of Each Major Food Industry for 1937

Industrial group [1]	*No. of industrial units*	*Man-hours worked (thousands)*	*Average number of employees*	*No. of disabling injuries*				*No. of days charged*				*Injury rates*	
				Death and perm. Total	*Perm. partial*	*Temporary*	*Total*	*Death and perm. total*	*Perm. partial*	*Temporary*	*Total*	*Frequency*	*Severity*
All groups	416	249,101	119,132	23	175	3,985	4,183	138,000	100,338	70,452	308,790	16.79	1.24
Bakeries	23	38,992	19,719	1	10	400	411	6,000	6,480	6,378	18,858	10.54	.48
Confectionery	9	7,581	3,866	0	3	93	96	0	3,309	1,307	4,616	12.66	.61
Corn products	10	14,127	6,153	3	18	189	210	18,000	3,915	3,250	25,165	14.87	1.78
Cereal manufacturing	12	8,635	4,048	1	5	130	136	6,000	3,400	2,103	11,503	15.75	1.33
Beverages	11	7,745	4,420	3	8	118	129	18,000	5,469	1,702	25,171	16.66	3.25
Sugar refining	8	15,512	6,997	2	15	249	266	12,000	13,245	4,396	29,641	17.15	1.91
Milling	62	12,674	5,778	3	12	205	220	18,000	5,045	4,601	27,646	17.36	2.18
Canning and preserving	145	22,864	19,871	1	17	458	476	6,000	5,650	8,035	19,685	20.82	.86
Dairy products	57	43,943	16,133	7	85	962	1,054	42,000	53,525	17,620	113,145	23.99	2.57
Other food products	17	11,700	6,760	0	2	361	363	0	300	9,707	10,007	31.03	.86

[1] Hotels and restaurants are omitted.

FREEZING METHODS *Evaluated*

Tests show which ways are best for fruits and vegetables. Reveal effects of different freezing rates on condition of product.

By J. G. WOODROOF
Georgia Experiment Station, Experiment, Ga.[1]

▶*Basic research on the effects of different rates and methods of freezing is reported in this article. Which makes it an important contribution to the knowledge of freezing and gives it practical value for*

Packers of Frozen Foods
Food Technologists
and Engineers

FREEZING BY THE IMMERSION METHOD, as described by R. B. Taylor, in FOOD INDUSTRIES, December, 1937, more nearly preserves the fresh qualities of the product than any other commercial method tested in our laboratories. The intensive study of methods of freezing, by examining the quality of the product produced, included samples of all commercial packs of fruits and vegetables available in the South, as well as a large number of packs not prepared in commercial quantities.

The method of freezing, the size of ice crystals produced, the loss of the juice through leakage on thawing, the firmness of the thawed product and certain color changes of fruits and vegetables are found to be correlated.

Throughout the period of study more than 2,000 measurements of ice crystals and "ice crystal patterns" were made, complete leakage tests were run on about 300 samples, 2,000 firmness determinations or pressure tests were made and detailed color studies on six types of products were included. The products consisted of ten fruits and seven vegetables, prepared by eight freezing methods. A description of most of the methods of freezing used in this study appeared in FOOD INDUSTRIES in April, 1938.

It was found that fruits and vegetables frozen quickly have a firmer texture after thawing than the same products frozen more slowly. It was also shown that very low temperatures (–105 deg. F.) produced certain objectionable effects, such as alteration in colors. The practical objective was to freeze quickly at moderate temperatures (0 deg. F.), which were economically obtainable. To best do this the product should be prepared in relatively small pieces and frozen by bringing it in contact with the freezing medium or refrigerant on all sides —immersion.

It was early determined that strawberries froze by immersion in five minutes and that ice crystals were formed in asparagus sufficiently small to be contained within individual cells. The leakage was found to be less and the texture of the thawed product was firmer than that prepared by any other commercial method thus far tested. Similar results on time and rate of freezing were obtained with blackberries, string beans, youngberries and rhubarb.

Asparagus frozen in an immersion solution without agitation had more than twice as much leakage as occurred when the solution was throughly agitated during freezing. On the other hand, asparagus frozen by immersion in a well circulated solution at 0 deg. F. produced only 0.6 per cent more leakage than that frozen by solid carbon dioxide. Figures on leakage of fruits and vegetables were found to be directly related to cell wall breakdown, as determined by miscroscopic examinations.

Rate of freezing was studied by exposing equal lots of blackberries to 0 deg. F. under three conditions. To determine the firmness, one berry was removed from each of the first two lots every minute and from the third lot every five minutes (Table I). The resistance of the berries, in pounds, was determined by placing the berry on spring scales with a dial face and

[1] Published with the permission of the Director as Paper No. 55, Journal Series.

Table I — Rate of Freezing Blackberries at 0 deg. F.

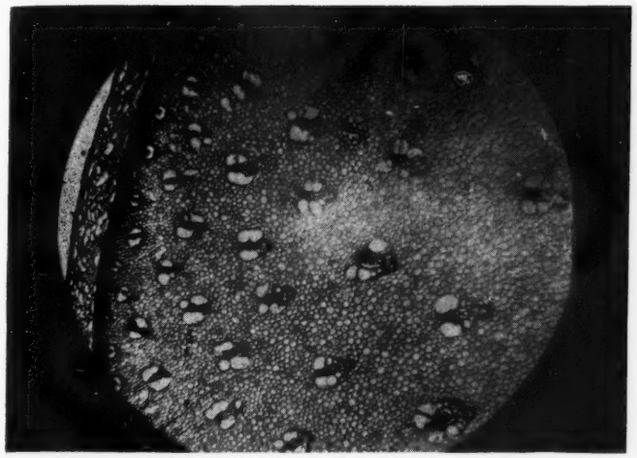
Method of freezing	*Minutes to begin freezing*	*Minutes to harden*	*Total minutes of freezing and hardening*
Immersion.....	5	26	31
On metal plate...	10	40	50
In 1-lb. packages.	50	70	120

Table II — Effects of Six Methods of Freezing Youngberries on Frimness and Amount of Leakage of the Thawed Product

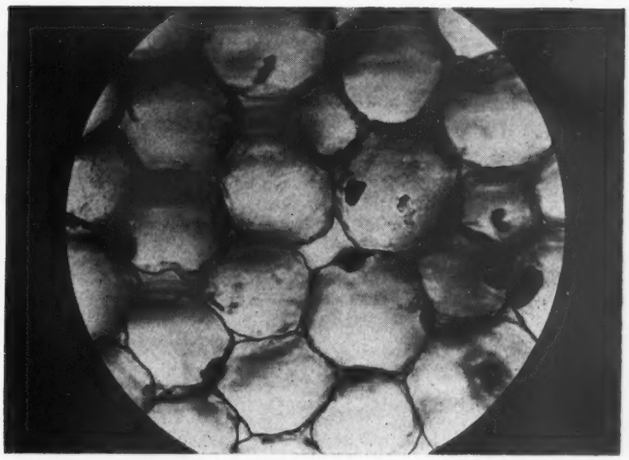
Method of freezing	*Leakage (per cent)*	*Firmness (grams to crush)*
Immersion, commercial pack, 0 deg. F.....	14.2	121.5
Unpackaged berries in contact with solid CO_2.....	13.4	115.0
Unpackaged berries on metal plate, 0 deg. F.....	27.5	97.0
1-lb. packages frozen in air blast, 0 deg. F.....	22.1	75.0
1-lb. packages frozen in still air, 0 deg. F.....	23.6	77.3
1-lb. packages frozen in still air, 20 deg. F.....	31.1	69.2

Table III — Effects of Six Different Methods of Freezing Asparagus on Amount of Leakage, Size of Ice Crystals and Condition of Thawed Product

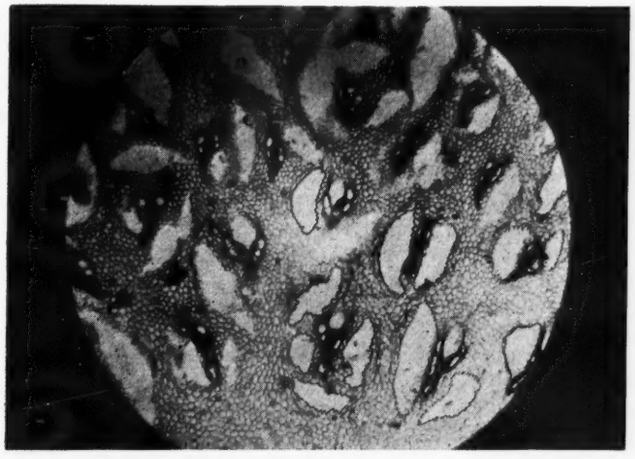
Method of freezing	*Leakage (per cent)*	*Average size of ice crystals (microns)*			*Condition after thawing*
		Thick	*Wide*	*Long*	
Individual stalks in contact with solid CO_2.....	1.9	6.1	18.2	29.2	Solid, bleached
Immersion, solution agitated, 0 deg. F.....	2.5	9.1	12.8	29.7	Tender, but solid
Immersion, solution little agitated, 0 deg. F.....	7.2	10.6	37.8	77.0	Slightly limp
Individual stalks frozen on metal plate, 0 deg. F....	7.3	15.3	63.1	86.6	Slightly flabby
12-oz. packages in double contact with metal plates, –40 deg. F.....	8.6	87.6	175.2	252.8	Flabby
1-lb. packages frozen in tunnel, 0 deg. F.....	22.3	324.4	544.8	920.5	Badly shrunken and flabby



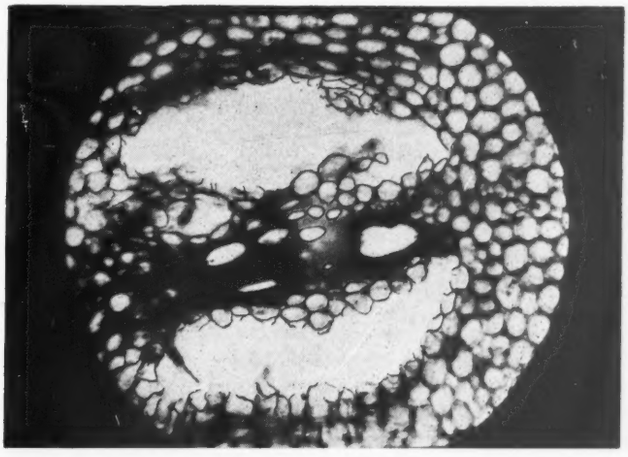
Cross-section of asparagus frozen by immersion. Notice that no cell walls were ruptured by ice crystals. Magnification x 17.5.



Highly magnified view of cells of asparagus frozen by immersion. The cell walls are stretched but not broken. Magnification x 90.



Size, shape and distribution of ice crystals in asparagus frozen by air blast. Magnification x 15.5.



Highly magnified view of ice crystals in asparagus frozen by air blast. Magnification x 94.

applying sufficient pressure to crush. (See Table I).

The time for freezing to begin was ten times as great when blackberries were placed in 1-lb. paper cartons, and twice as great when lying on a metal plate, as when frozen by immersion. The hardening period of berries immersed was shorter, but the variations between the lots were not so great as the time for the first ice to form.

The influence of method of freezing on firmness and per cent leakage of youngberries was determined by freezing the freshly picked berries by six methods and then subjecting the thawed berries to pressure and leakage tests after two weeks in storage at 0 deg. F. In Table II the six methods are listed in order of the desirability, or quality, of the resultant product.

Table III summarizes results of the influence of six methods of freezing asparagus on leakage, size of ice crystals and condition of stalks after thawing. The methods are listed in order of desirability of the product. The first method, while producing small ice crystals and a firm product, is of doubtful commercial value because of the relative expense, and for practical purposes would be eliminated for the present.

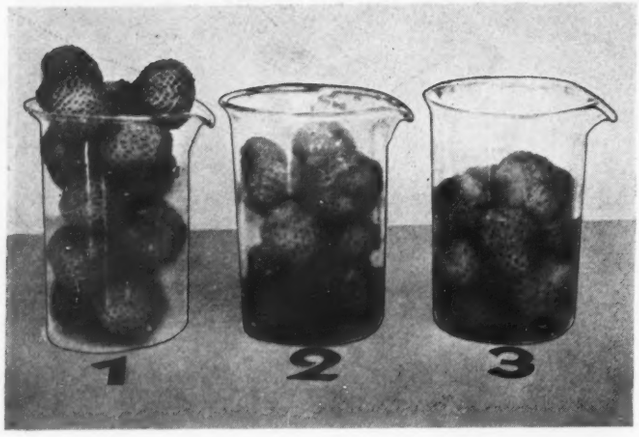
Table IV shows the per cent leakage and size of ice crystals in rhubarb when frozen by three methods.

In Table V are summarized effects of five methods of freezing Blakemore strawberries on the leakage, firmness and condition of thawed berries. The methods are listed in order of their desirability, the immersion method coming first and showing up approximately 100 per cent better than the double contact method, which is by far the best for berries that were frozen in the package. Strawberries frozen by immersion and kept at 0 deg. F. for one year showed an increase in leakage of about 10 per cent; other samples frozen by immersion and hardened in contact with solid carbon dioxide produced an increase in leakage of about 3 per cent.

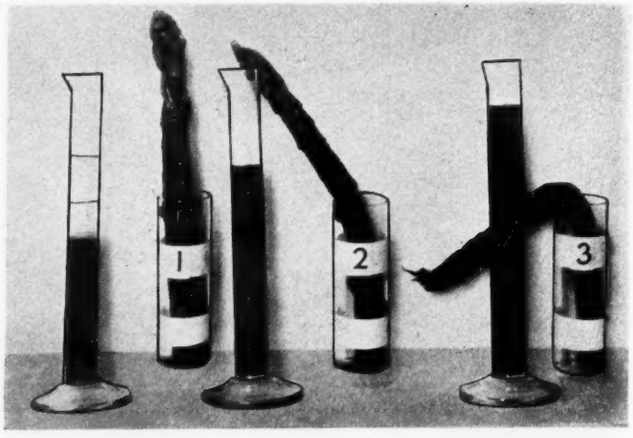
Table VI shows the effects of six methods of freezing string beans on the size of ice crystals. These crystals are some of the largest recorded, due largely to the fact that fresh beans, after being blanched, are very tender, and the tissue offers a minimum of resistance to movement of water and the growth of ice crystals. The methods are listed in order of desirability of the product produced.

While frozen carrots are not a major product, the tissue is well suited for the study of ice crystal formation. In Table VII is given the size of ice crystals when carrots were frozen by six methods. Barring the use of solid carbon dioxide as being non-commercial, the immersion method is far superior to any of the others. The pieces of product (1 x 2 in.) were larger than usual in commercial packs, resulting in slower freezing of individual pieces and, consequently, larger crystals than would have been the case had the pieces been smaller. There was a noticeable difference in size of ice crystals near the surface and on the interior of the separate pieces.

During the investigation it was



How strawberries frozen by different methods looked after thawing. Each beaker contains the same weight. The berries in beaker 1 were frozen by immersion; in beaker 2, by double contact method; in beaker 3, by air blast.



Amount of leakage from asparagus frozen by different methods, each graduate containing the leakage from six stalks. That in graduate 1 is from asparagus frozen by immersion; in 2, by double contact; in 3, by air blast. Note limpness of stalks with high leakage.

found that very wide variations existed in products, due to methods of freezing. The leakage in different samples of asparagus varied as widely as 100 times, while the volume of ice crystals differed as much as 200 times. The firmness (grams to crush) of youngberries or strawberries varied as much as 30 times. Similar variations existed in general appearance, color and attractiveness.

Thus it was possible to separate desirable from inferior products and determine specifically the treatments associated with the products of varying qualities. From laboratory and microscopic examinations of frozen products, the following definition is given of acceptable, quick frozen foods:

a. The ice crystals should be 20 x 50 x 60 microns or less (60,000 cu. microns) in thickness, width and length, respectively, in vegetative tissues, as asparagus and rhubarb. This permits the crystals to exist between or within cells of most tissues without rupture. With mature fruits as peaches and berries, as well as seed of peas, beans and corn, a good product may be had with crystals considerably larger.

b. Heat removal should be sufficiently rapid to cause ice formation in tissue to progress at the rate of 0.3 cm. per minute or faster. At this rate a strawberry one inch in diameter will freeze in five minutes.

c. The completely thawed product should retain enough firmness or turgidity to be acceptable by the trade as fresh product. Figures for specific products are given below:

	Force to crush (grams)
Strawberries, average size	150 or more
Youngberries, average size	115 or more
Asparagus, sections, 15x15 mm.	60 or more
Peach, cubes, 15x15 mm	60 or more

d. Natural colors, particularly green, red and yellow, should be sufficiently retained, not only in their entirety, but in distinctly differentiated regions, so that the product is acceptable by the trade as fresh product.

Tests with asparagus and string beans have shown that, when the rate was reduced to 0.3 cm. per minute, a measurable difference was detected in the amount of leakage and cell destruction. And when the rate was reduced to 0.1 cm. per minute, a distinctly inferior product was produced. Asparagus, frozen rapidly by solid carbon dioxide or by immersion, contained more than 90 per cent of the ice within cells with only an occasional cell wall ruptured, while asparagus, frozen very slowly at the rate of 1 cm. per hour, had more than 75 per cent of the cell walls ruptured, and little evidence of ice formation within the cells.

For a product to be "quick frozen," the ice crystals formed must be sufficiently small to be contained within or between the plant cells without rupturing them. And for this condition to obtain, the rate of freezing must be 0.3 cm. per minute or faster. To the extent that the freezing rate is slowed down, ice crystals become larger and quick freezing ceases regardless of what temperature is used.

Quick and uniform freezing requires that relatively large surface areas of the product be exposed to the refrigerant. A liquid refrigerant coming in direct contact with the product and kept constantly agitated seems to approach this ideal. To meet these requirements the product must be frozen before packaging.

Quick freezing also requires that the product be in small pieces. We have found it difficult to quick freeze the interior of large stalks of asparagus. Variation in rate of freezing was especially noticeable in carrots of various sizes, even when freezing with solid carbon dioxide. We did not get extremely small ice crystals near the

Table IV — Effect of Three Methods of Freezing Rhubarb on Leakage and Size of Ice Crystals

Method of freezing	*Leakage (per cent)*	*Size of ice crystals (microns)*		
		Thick	*Wide*	*Long*
Immersion, 0 deg. F.	20.4	9	39	72
Contact with solid CO_2	20.6	10	31	85
12-oz. packages in double contact with metal plates, −40 deg. F	26.2	24	86	120

Table VI — Effect of Five Methods of Freezing String Beans on Size of Ice Crystals

Method of freezing	*Size of ice crystals (microns)*	
	Thickness	*Width*
Immersion 0 deg. F	64	142
Solid CO_2	75	252
On metal plate, 0 deg. F	277	700
1-lb. package, air blast, 0 deg. F.	256	730
1-lb. package, air blast, 28 deg. F.	553	1,517

Table VII — Effect of Six Methods of Freezing Carrots on Size of Ice Crystals

Method of freezing	*Size of ice crystals (microns)*	
	Thickness	*Width*
Solid carbon dioxide	41	81
Immersion, 0 deg. F	42	99
12-oz. packages in double contact with metal plates, −40 deg. F	295	669
Unpackaged stalks in single contact with metal plate, 0 deg. F	245	930
1-lb packages in air blast, 0 deg. F	468	1,003
1-lb. packages in air blast, 28 deg. F	1,012	1,018

center of carrots that were 1½ in. in diameter or larger.

Tangential ice crystal masses appeared near the surface of frozen tissue while those on the interior were either radial, tangential or crosswise, sometimes reaching 1 cm. in length. Asparagus, string beans, carrots and rhubarb were satisfactory materials for study, halves of string beans being most suitable. The first crystals formed were the smallest and on the convex side in a tangential position. The next to form were slightly larger and on the concave surface in a slightly less tangential position. On the interior were large, globose masses of ice, more or less perpendicular to the convex surface. The types of cells somewhat influenced the position of ice crystals in string beans.

In asparagus, tangential flakes were in the cortex within 1 mm. of the surface, while large globose crystal masses were from 2 to 3 mm. beneath the surface; and rather narrow flakes, radially arranged, were in the center. The radial flakes were about twice as long as wide, and ten times as wide as thick, representing a ratio of 1:10:20.

Ice crystals were always more numerous at or near the periphery of the pieces of product being frozen, diminishing towards the center. The ice masses grew for a while after freezing began. If the latter was slow and the cell walls were highly permeable to the movement of water, crystals were large and few in number. If, however, free water became available more slowly than heat was removed, "seeding" occurred in more than one place and many, but smaller, ice crystals formed. Therefore, to obtain the best product it is desirable that the cell walls be impermeable and heat removed as rapidly as possible to produce "seeding" in individual, or at least, in adjacent, cells. The ideal in freezing preservation is not only to freeze the individual fruits, or parts of fruits, individually, but to freeze each cell as a separate unit. If this is done, the elasticity of the cell walls will permit the formation of very small ice crystals without rupturing.

The presence of thick wall cells, as well as that of existing ice crystals, influences crystal growth by limiting the supply of available water. Thus, any obstacle in the vertical or horizontal passage of water in tissue influences the position and location of ice crystals.

When a cell sap was cooled faster than the freezing point was lowered by concentration of sap by freezing, ice formation occurred inside the cells and caused damage. As crystals formed first outside the cells, the limiting factor was the rate at which water could escape from the cell; hence, the higher the permeability to water the less the damage from intercellular ice. The smaller and more rounded the ice crystals, the less the mechanical injury to cell walls and protoplasm.

The rate of heat removal from the time the first crystals appeared until the tissue was completely hard was the determining factor in size and number of ice crystals. It was found that ice crystals in asparagus could be increased up to 2,000 times in volume by slowing up the rate of freezing, as compared with freezing in direct contact with solid carbon dioxide. Large crystals produced by slow freezing not only ruptured the walls of thousands of parenchyma cells within the asparagus stalks, but frequently burst though the cortex for distances of more than a centimeter and projected out the end of the stalk for a half centimeter.

Ice crystals produced by quick freezing tend toward a lenticular shape, or the shape of a water droplet slightly flattened and lengthened. This is the shape that produces least damage to tissues whether the crystals be within or between the cells. When freezing is extended over an hour or more, the crystals grow in directions of least resistance, producing ice crystal masses of indefinite shapes. Water for crystal growth is drawn from surrounding areas for a distance of a dozen or more cell diameters.

The vessels seem to play an important part in ice crystal formation. With thickened walls, they resist being ruptured themselves, but they appear to be channels through which water passes more easily than through parenchyma cells, and they are located close to the site of the largest crystal masses. When freezing is very rapid by solid carbon dioxide or immersion methods and the percentage of ruptured cells is very low, the latter are always located very close to the vessels of the vascular bundles.

The shape and size of ice crystals is closely related to time and rate of freezing as well as pretreatment of the product. Since the free water is to be frozen anyway, it is a matter of forming many small crystals or fewer large crystals. The range is extremely wide and flexible. Many possible courses may be taken, and the conditions determining them may be decided within a few minutes, all of which play a vital part in the quality of product produced. Some of these conditions are:

a. Will crystal initiation be within or between the cells?
b. Will available water freeze in place as small crystals or will it be pulled together as large crystals?
c. In which direction will water move, in determining shape of crystals?
d. How far will water flow in determining size of crystals?
e. To what extent will crystals rupture cell walls?
f. How much of water will be restored to the protoplasm after thawing?

These many possible courses of behavior emphasize the importance of adopting very rigid and uniform conditions for freezing products. It is certain that the use of a specific temperature alone does not insure a superior, or even a uniformly frozen, product as much as does the method and rate of application of the temperature. If from one to several layers of insulating material in the form of cardboard and wrappings separate the product from refrigerant, heat transfer is relatively slow, even when a temperature far below zero is used.

The immersion method of freezing was the only commercial method tested that produced ice crystals that were formed within or between cells of asparagus without rupturing the walls. In most of the samples frozen by immersion and examined, the amount of ruptured cells was less than 3 per cent, and in those frozen with solid carbon dioxide, from 1 to 2 per cent. With the double contact method, the amount of ruptured cells ranged from 15 to 50 per cent, depending upon the location in the package.

The type of tissue influences shape and size of ice crystals, as illustrated by string beans when blanched and frozen by immersion. These contained ice crystals 9 x 23 x 23.6 microns. When similar beans were cooked and frozen, the crystals were 4.8x12.8x44 microns, or less than

(*Turn to page 659*)

Table V — Effects of Five Methods of Freezing Strawberries on Leakage, Firmness and Condition of Thawed Product

Method of freezing	*Leakage (per cent)*	*Firmness (grams to crush)*	*Condition of thawed product*
Immersion, 0 deg. F.	14.0	167	Quite firm, color normal
Individual berries in contact with solid CO_2	19.8	154	Quite firm, bleached
12-oz. packages in double contact with metal plates at –40 deg. F.	27.0	96	Soft, color normal
12-oz. packages frozen at 0 deg. F.	42.3	38	Flabby, water soaked
12-oz. packages frozen at 28 deg. F.	34.6	34	Mushy, water soaked

QUICK FREEZING FOODS

With Multi-Stage Tubular Freezers

System installed at Chehalis, Wash., provides economy and convenience for freezer of fruits and vegetables.

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PART I
How the System is Designed

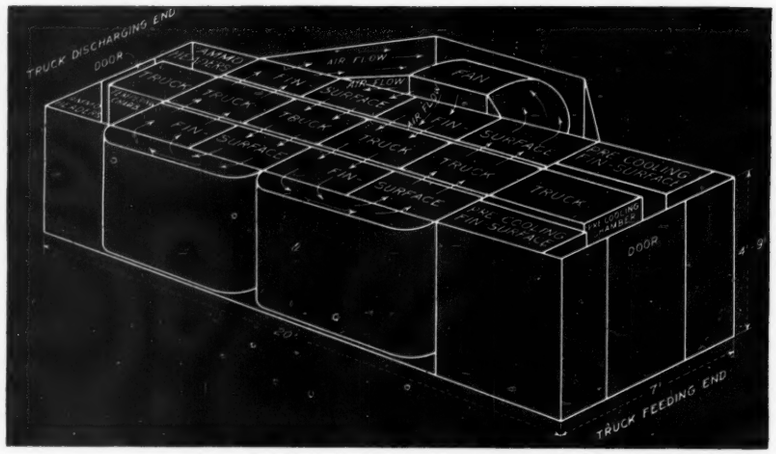


Diagram of Multi-Stage Tubular quick freezing apparatus showing arrangement of stages, air circulation, and heat transfer surfaces.

FLEXIBILITY of operation such that a large variety of products could be frozen adequately and economically, was sought by National Fruit Canning Co., when it recently installed new freezing equipment designed by the writer in its plant at Chehalis, Wash. The installation made provides for a combination of truck and tray freezing. It has six stages, consisting of one pre-cooling stage, four freezing stages, and one product tempering stage.

The entire freezing equipment is inclosed within a 22-gage sheet metal housing supported on an internal framework of electric welded structural steel. The overall outside dimensions are 20 ft. long, 8 ft. 6 in. wide and 4 ft. 9 in. high, excluding the fan. In commercial operation this freezer produces more than 2,200 lb. of frozen peas per hour, and corresponding quantities of other frozen products.

Approximately 10,000 sq.ft. of heat transfer surface is used in the freezer. This is arranged in two vertical banks of liquid ammonia flooded recirculating tubes with extended fin surfaces. These are housed over to form the freezing tube, as shown in the accompanying diagram. The tube thus formed is 32 in. wide, 48 in. high, and 196 in. long. It accommodates trucks with trays, which are of such dimensions as to allow just sufficient clearance for passage through the tube. When all stages of the freezing tube are functioning, it holds six trucks, one in the precooling stage, four in the freezing stages, and one in the tempering stage.

Each truck is fitted with ten freezing trays and has an air-tight metal wall at one end. The trucks are also equipped with adjustable air baffles, arranged on each side of the trays, in staggered relation so as to force air up and down through the product on the trays and automatically to reverse the direction of flow of the air when horizontal air flow is reversed. When the freezer is loaded with trucks, the closed ends of the trucks serve to separate the interior of the tube into six separate compartments.

Trucks are of welded construction, hot galvanized after fabrication. Each is fitted with a guiding device on top and bottom, to engage similar devices in the freezing tube so that the trucks will travel through in a straight line. All trucks are equipped with four roller bearing wheels, two of which are of swivel type.

Produce trays are 1½ in. deep, and are made of 3/16 in. mesh, 14 gage heavy galvanized steel screen. Heavy galvanized metal is used to reinforce all tray edges.

In operation, loaded trucks are pushed by hand into the precooling stage. A short conveying chain automatically moves the trucks on through the succeeding stages. This conveyor is equipped with a limit switch which stops all trucks in proper position to form and seal the air passage in each freezing stage.

When the freezer is loaded, each truck conveyed from the pre-cooling stage causes all the trucks ahead to advance one stage; and moves the truck in the final, or tempering, stage out from the freezing tube through the auto-close type freezer doors. Movement of the trucks from one stage to another is based on the time required to freeze various kinds of food.

Heat transfer in all freezing stages is the same, excepting for differences in temperature and physical condition of the recirculated air. Also, heat transfer in the pre-cooling and tempering stages is the same, with the identical exception.

THE METHOD of air distribution consists of splitting the air discharged from the fan into two streams, as shown in the diagram. One stream is directed through the second and then the first freezing stages, while the other stream is directed through the third and then the fourth freezing stages, again as shown in the diagram. Air flow passages, formed by the refrigerant heat transferring surfaces, are restricted so as to cause an air velocity of about 1,270 ft. per minute over and in contact with these surfaces. The trucks with trays and produce are used to restrict the air flow passages in each freezing stage so that air at 1,050 ft. per minute velocity is in contact with the product being frozen. The recirculated air is cooled in two steps, one before and

one after passing through each freezing stage.

Each of the six cooling and freezing stages removes but a fractional part of the total heat in the produce, and this amount of heat is promptly transferred to two air cooling stages before similar heat transfer occurs in the following stages. The entire volume of air within the freezing tube is recirculated every two seconds. The total length of air travel from the discharge of the fan to the return air inlets of the fan is 17 ft. This includes the distance through the fan discharge duct, all refrigerated heat transfer surfaces, all produce freezing stages or compartments and the return air duct to the fan inlet.

The pre-cooling stage and the tempering stage have no forced air circulation, thus serving the purpose of air locks at each end of the freezing tube. The two recirculated air streams are balanced in respect to air flow resistance. This condition, in conjunction with the refrigerated air locks at each end of the freezing tube, precludes the possibility of any warm outside air entering or mixing with the recirculated air streams used for freezing.

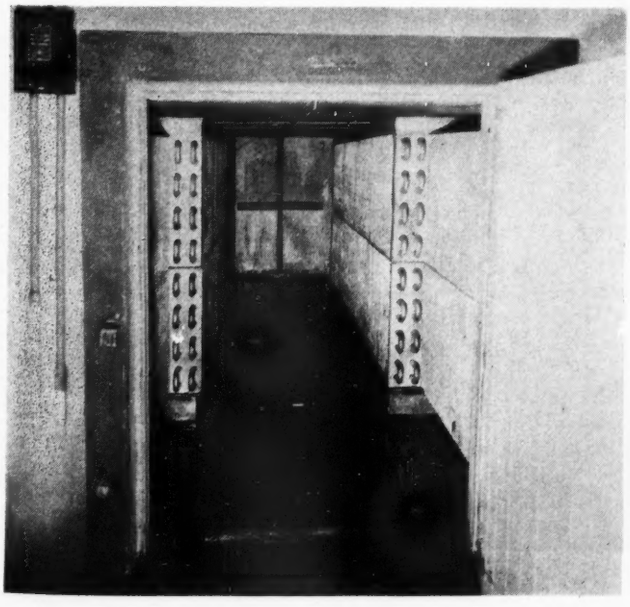
Recirculated air flow direction is reversed as each freezing truck advances to the next freezing stage, and the vertical air flow up and down through the trays of produce is likewise reversed. These conditions of air flow greatly accelerate heat transfer and cause a uniform freezing action to occur in all freezing stages.

The time required to freeze various foods with this equipment materially varies with the kind, arrangement and other factors affecting the rate of heat transfer. The following figures for peas indicate normal results to be expected under continuous full capacity operation for periods of twelve to eighteen hours. Peas entering the freezer at 64 deg. F. and leaving at 5 deg. F., are frozen in 30 minutes. This requires a refrigerant temperature of –1 deg. F., corresponding to a suction pressure of 15 lb., and the temperature range between the first and fourth freezing stages is 12 deg. F. to 4 deg. F. The tempering stage has a temperature about the same as that of the recirculated air in the fourth freezing stage (4 deg. F.).

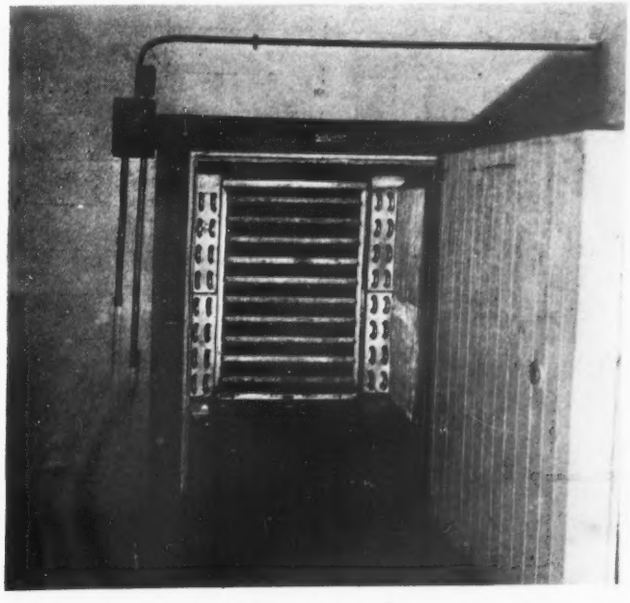
NUMEROUS TESTS conducted under full load commercial operation show that the temperature of the peas discharged from the freezer is about 1 deg. F. above that of the recirculated air temperature leaving the food in the fourth freezing stage. Of course, the recirculated air temperature may be lowered to any desired point, such as required for freezing sliced berries with high sugar content, or asparagus in cartons. But it is desirable, from the standpoint of economical operation, to operate the freezer at the highest possible temperature. A saving of one kilowatt hour is made, and necessary compressor capacity is reduced over 3 per cent, for every 1 lb. increase in the refrigerant suction pressure, per ton of produce frozen.

Before discussing the actual operation of the plant at Chehalis, notice should be taken of some of the theoretical considerations surrounding the design of this Multi-Stage Tubular Freezing system. Multi-Stage freezing means exactly what the term implies, that is, freezing in steps or stages, and cooling the secondary heat transferring medium in steps or stages as the freezing progresses. Freezing in tunnels or similar constructions, on trucks with multiple trays, with forced air circulation is not a new practice, but has been in commercial use for over thirteen years. A plant of the writer's design that has these features, has been freezing fancy ice cream cakes, small ice cream packages and the like for ten years. But forming a tube with heat transferring surfaces and multi-staging the heat transfer from the product to such surfaces is a recent development, covered by U. S. Patent No. 1,925,033 and several patents pending, embodying method and apparatus.

Recent inferences (see "Quick Freezing Methods," by Ralph V. Grayson, The Canner, April 12, 1938, p. 18) tend to confuse multi-stage compression with multi-stage freezing. From the standpoint of costs, and operating conditions as applied to quick freezing, I do not recommend or use multi-stage compression, booster compression, compound, or dual compression, although I am fully aware of the various conditions in which their use is suitable. However, where it is advisable to main freezing temperatures below a zero air vapor pressure (–40 deg. F.), the use of an absorption system should be considered. This is particularly so in canning plants, where an economical source of heat is readily available.



Interior view of a Multi-Stage Tubular Freezer, with all freezing trucks removed.



In this view of a Multi-Stage Tubular Freezer, the pre-cooling stage is empty, and a truck is shown in the first freezing stage.

The quality and appearance of frozen produce is affected by the method of freezing, whether quick or slow. When freezing occurs in air at temperatures above —40 deg. F., regardless of temperature, the principal deteriorating effects are caused by dehydration. Experimental and commercial tests tend to indicate that four factors are mainly responsible for this: (1) The mean temperature difference between the air in contact with the produce and the cooling medium; (2) The "real" air temperature rise, on and off the produce; (3) The relative humidity of the air; (4) The time that the produce is subjected to factors 1, 2 and 3.

Air velocity during freezing has relatively little effect on the amount of moisture loss occurring in individually frozen produce, such as beans, peas and berries. Tests show that the shortening of freezing time with various practical air velocities inversely compensates in the amount of moisture loss from such products, providing the air is properly distributed. The "real" air temperature rise, on and off the product, should not be confused with the "apparent" temperature rise, usually taken from a mixture of air off the product and a large quantity of by-passed air.

"Multi-Stage" freezing reduces moisture loss, compared to conventional-type air freezing systems, in the following ways: (1) By maintaining a relatively small temperature difference between the air in contact with the produce and the refrigerant; (2) By maintaining a relatively small (real) temperature rise of the air on and off the produce, and procuring proper air distribution at a high velocity; (3) By maintaining a high relative humidity in the recirculated air used for freezing; (4) By providing suitable flexibility necessary to secure and maintain the optimum freezing time required for various foods.

AIR DISTRIBUTION is far more important than air velocity. A 100-ft. per minute air velocity, effectively distributed, produces better results than a 1,000-ft. velocity that is largely short-circuited and by-passed. Because of the low specific heat of air, it is necessary to recirculate a very large volume of air through most air blast freezers in order to obtain a relatively small rise in the temperature of the air on and off the product. Adequate distribution of such a large quantity of air is impractical and costly in power consumption. In the multi-stage system, the quantity of recirculated air can be reduced in proportion to the number of stages, while maintaining the same air temperature rise. That is, a four-stage freezing unit requires only one-quarter of the air volume needed for a single stage, an eight-stage unit, one-eighth of the air volume, and so on. These reduced air volumes permit the air passages to be restricted, thus accelerating heat transfer; and afford a simple means for providing adequate and effective air distribution at a high velocity.

Much speculation still exists as to the best rate of freezing for various foods. For some reason, there is still confusion between the rate, or time element, of freezing and the temperature used for freezing. Freezing temperature, or the temperature difference existing between the refrigerant and the product being frozen, is only one of the numerous factors affecting the freezing rate or time required to freeze a given product. It is possible, practical and economical to accelerate the rate of freezing for some products well over 50 per cent without lowering the freezing temperature. The various conditions other than temperature to which the foods are subjected during freezing are equally important if excessive deterioration is to be avoided. While multi-stage freezing affords an effective and efficient means for freezing various foods, either individually or in containers, at any desired temperature, from the standpoint of economy I do not recommend the use of lower temperatures than are necessary to produce a high quality frozen product.

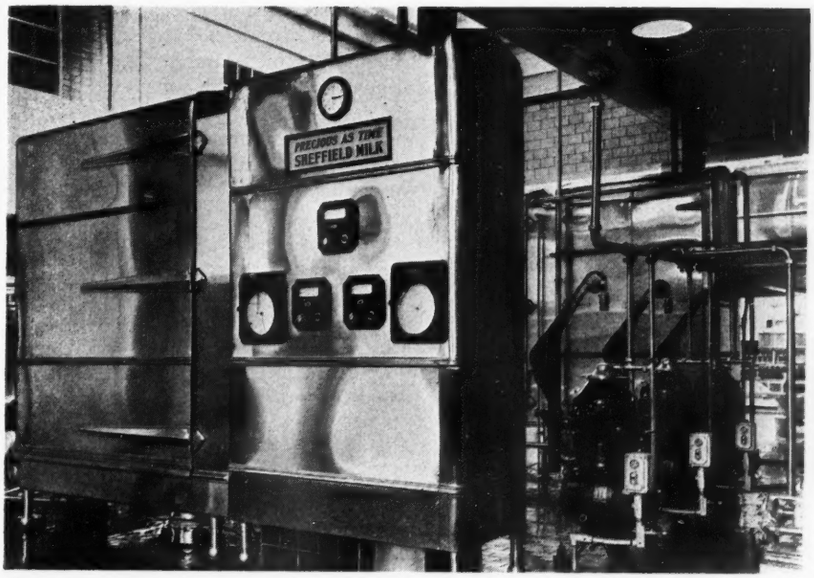
It is very difficult to understand how any benefits are gained by lowering the temperature of frozen foods to –40 deg. F., or thereabouts, when the foods are later stored at approximately 0 deg. F. This is because frozen foods follow physical laws which cause them to expand or contract with such temperature variations. Such low temperatures are not necessary to hasten freezing, if other means of accelerating heat exchange are fully employed. In this matter of time and temperature, my experience and comparatively limited observations coincide with the findings of Diehl and Berry; Lutz, Caldwell and Moon; Wiegand, Morris and Barker; and others who have expended much effort on the matter.

The importance of a preliminary engineering survey before starting on a freezing program is often disregarded. The casual attitude of the frozen food industry in this matter is not only reflected in quality of product, but also in excessive initial investment, costly future extensions, high operating costs, and cumbersome and inadequate handling facilities. This applies not only to new installations, but also to major changes in existing plants.

In Part II of this article, to appear in "Food Industries" for December, 1938, the actual installation at Chehalis and its operation will be discussed.

A loaded freezing truck is shown emerging from the automatic doors at the discharge end of the tempering or final stage of a Multi-Stage Tubular Freezer. Note the metal truck end, which serves to separate the stages when all six trucks are in place in the freezer tube.

Pasteurizing at 57th STREET



Milk from the storage tanks on the second floor balcony above flows to the centrifugal clarifiers shown at the right, where it is filtered, and is then pumped to the heaters at the left

World's largest milk plant featured by simplicity in layout of equipment, piping and conveyors, resulting in economy and ease of operation, cleaning and maintenance

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RELIABLE AND ECONOMICAL OPERATION, combined with low maintenance and cleaning costs, were the ends sought in the design of the pasteurizing and bottling departments of "57th Street," Sheffield Farms' new plant in New York City. The considerations surrounding the choice of the site and the methods of milk distribution adopted also influenced this design. These latter points, together with the engineering of the plant, are discussed in three previous articles in FOOD INDUSTRIES (Sept., 1938, pages 492 to 495; Sept., 1938, pages 496 to 500; and Oct., 1938, pages 550 to 554).

In these articles, mention was made of the main freight line of the New York Central Railroad, which passes directly beneath the building. This made possible the construction of two spur tracks upon which milk cars can be spotted. In this way, most of the milk supply is received in tank cars and unloaded directly from them. Provision is also made for milk delivery by truck, when that course is desirable.

Rail delivery of raw milk is made on the basement level and truck delivery on the street level, as shown in Fig. 1. In either case, milk is pumped through short lines of sanitary pipe by means of pumps located adjacent to the tracks in the basement.

As this plant handles only Grade B milk, all milk received is pumped to one or the other of two weigh tanks, located in a tank scale room adjacent to the track. These are steel tanks, lined with stainless steel, and each has a capacity of 17,600 qt. Agitation is provided for each weigh tank, which is mounted on a beam type scale of 50,000 lb. capacity.

Storage tanks for milk are on the second floor directly over the weigh tanks, so that the lines of sanitary pipe connecting the two sets of tanks are of minimum length. There are three of these insulated storage tanks, constructed with stainless steel jacket and shell and each equipped with an agitator. The capacity of each tank is 22,000 qt.

When the capacities of the two weigh tanks and the three storage tanks are taken together, the total storage capacity provided is 101,200 qt. Space is available for future installation of two more storage tanks, bringing the eventual storage capacity up to 145,200 qt.

These storage tanks are placed on a balcony on the second floor, overlooking the two-story milk pasteurizing and filling room. From the tanks, the milk flows by gravity to the filtering equipment located directly beneath, on the first floor. Filtering is done in three centrifugal clarifiers each of 11,000 qt. per hour capacity. These separate any sediment from the milk by centrifugal force, as the milk travels toward the center of a high-speed whirling bowl. (See FOOD INDUSTRIES, April, 1937, page 232.)

After leaving the clarifiers, the milk is pumped a short distance to the top of one of the two heaters, located on the first floor, between the clarifiers and the holding tanks. Heaters are of the surface or tube sheet design, in which the milk flows over the outside of tube sheets, with the tubes carrying the heating medium. The heaters raise the milk from 40 deg. F. to 144 deg. F. during the 15 seconds required for the milk to flow from top to bottom of the tube sheets.

▶ ***Sanitary piping is no longer confined in use to dairies and beverage plants. In recent years it is being widely adopted by all other branches of the food industry where liquid food ingredients or products are handled. The Sheffield pasteurizing plant described in this article was designed with the definite purpose of keeping the lines of sanitary pipe as short as possible, in order to minimize the labor and expense of daily cleaning. Study of this design will be profitable to***

All Food Engineers

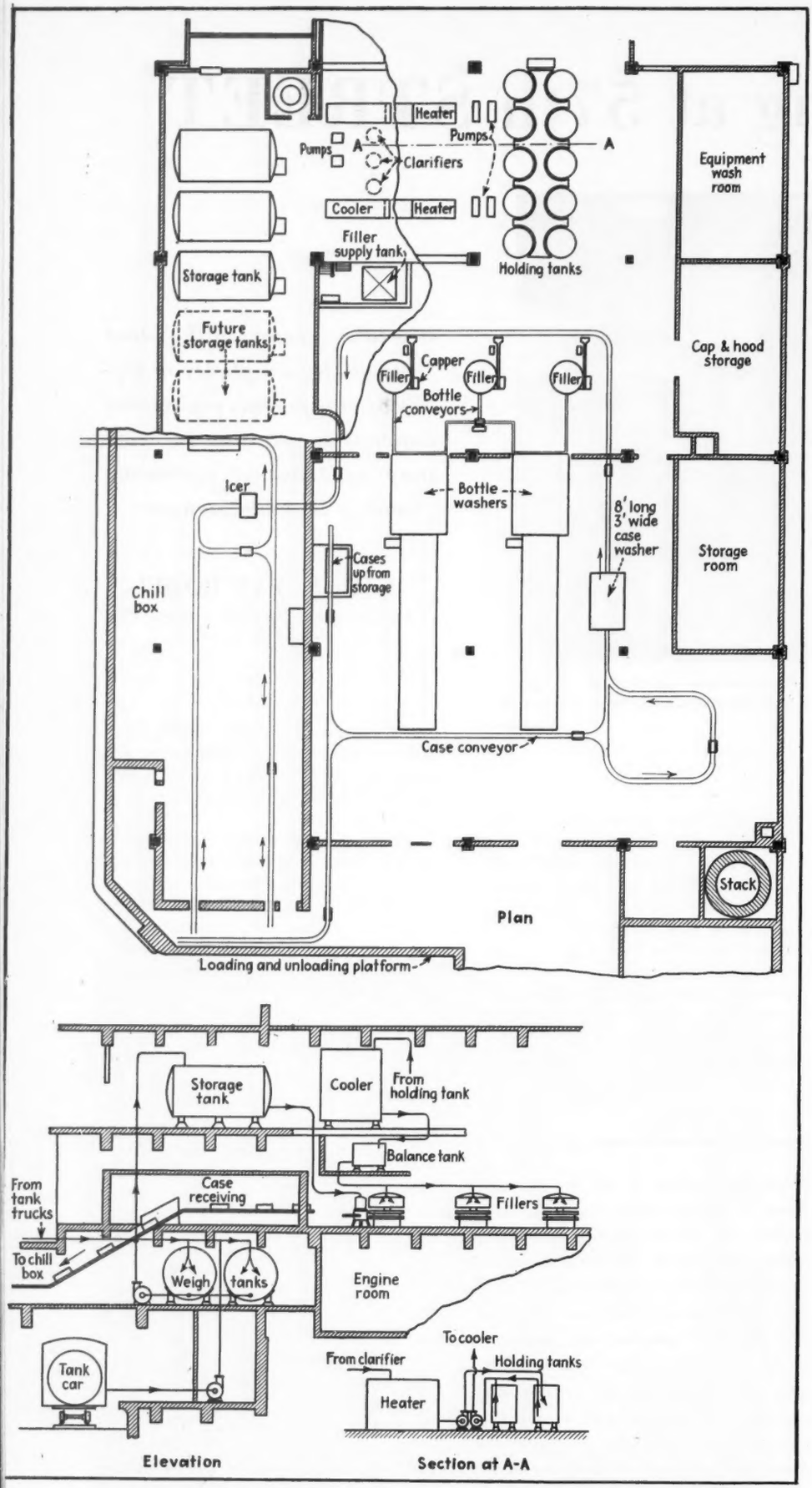


Fig. 1—Plan and elevation of the milk pasteurizing, bottle washing and bottle filling departments at Sheffield's "57th Street" plant. Note the shortness of the runs of sanitary pipe needed to take milk from unloading points to weigh tanks, to storage tanks and through bottling and filling. Note also the directness and simplicity of the conveyor layout

Milk heating and cooling in this plant is of the regenerative type, carried out with hot and cold water as heating and cooling mediums (see Fig. 2). The regenerative sections of the heaters and coolers are tied together in a closed circuit so that the heating medium of the heater regenerative sections is the cooling medium of the cooler regenerative sections. As the water passes through the tubes in the regenerative sections of the coolers, it is heated by milk that has just come from the holding tanks at a temperature of 144 deg. F. This heated water is cooled in the regenerative sections of the heaters, where it gives up heat to the entering cold milk, which it heats to 120 deg. F.

Referring to Fig. 2, Valve I, in the final heating circuit, and Valve II, in the regenerative circuit, are adjusted to produce pressure differentials sufficient to allow the $1\frac{1}{4}$ in. control valves to pass hot water into their respective circuits, when called for by the thermostats operating the control valves. At the same time, water in amounts equal to those admitted by the respective control valves leaves each circuit and returns to the instantaneous heater through the hot water return line. In this manner the water temperatures required in the regenerative and final heaters are maintained.

At the end of the run, when cooling alone is required, city water is admitted into the regenerative circuit by opening Valve III. Valves IV and V are closed, and Valve VI opened, allowing warmed city water which has passed once through the regenerative cooler sections to flow to the reclaimed water tank, when it is later used to supply the hot water for the building.

THE CONTROL VALVE in the final heater circuit is operated by a thermal element placed in the milk leaving the heater, but is also equipped with a limit control which prevents the control valve from raising the temperature above a predetermined point, as would tend to occur if milk flow stopped. Provision is also made to pass cold water through the final heater circuit if the milk flow is stopped for any length of time, in order to prevent cooking of the milk film which remains on the tubes.

After leaving the regenerative sections of the heaters, milk flows over the lower, final heater sections. The tubes in these sections are supplied with hot water at a temperature sufficiently high to heat the milk from 120 deg. F. to 144 deg. F.

These surface type milk heaters are each 10 ft. 6 in. high and 13 ft. long. They are constructed of stainless steel.

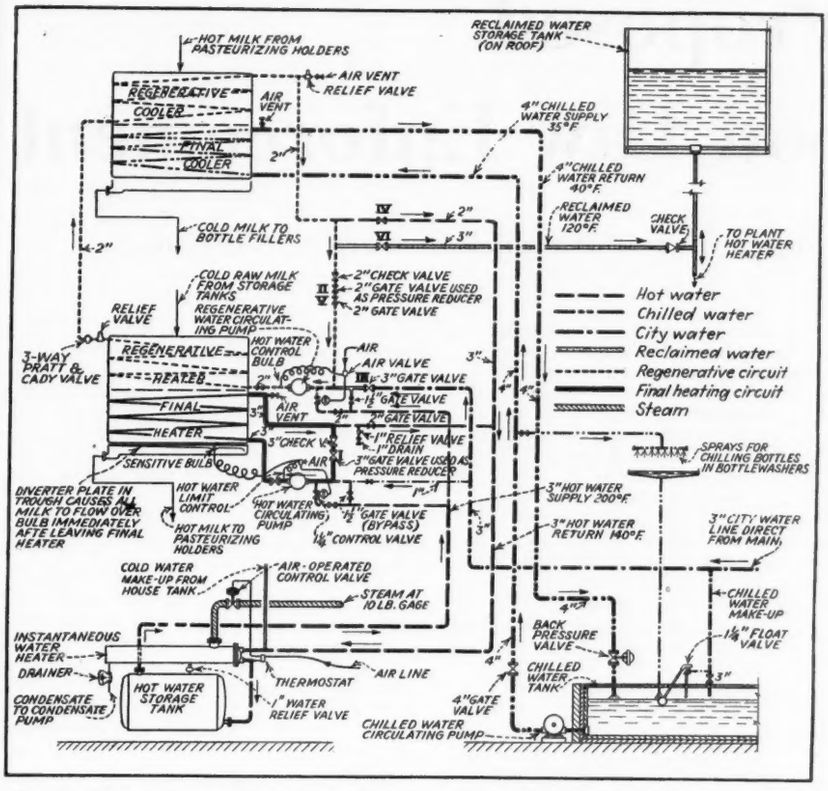


Fig. 2—Piping diagram for water flow for regenerative milk heating and cooling, showing control methods used. Note the arrangement for reclaiming the heat from the water used in milk cooling at the end of each day's run, after milk heating has been stopped

At present each of these heaters has a rated capacity of 24,000 lb. per hour. This can be increased to 32,000 lb. per hour by adding 4 tube sheet sections. Provision for this addition was made when the heaters were built, so that the plant capacity can easily be increased when need arises.

From the heaters, the milk is pumped to the holding tanks. There are ten of these tanks, each built of stainless steel, equipped with an agitator and having 1,600 qt. capacity. Rated capacity of the ten tanks is 54,000 lb. of milk per hour. These tanks are equipped with a Precision Milk Holding System, which automatically fills and empties them, insuring that each tank holds its contents for an exact period of 30 minutes at 144 deg. F. before it is emptied and again filled.

On leaving the holding tanks, the milk is pumped directly to one of the two milk coolers, which are placed on the second floor balcony of the pasteurizing room. Milk entering a cooler flows first over the top or regenerative section, the operation of which has already been described in connection with the regenerative circuit of the heaters. Cooling of the milk is completed on the lower sections of the coolers. Ice water is circulated through these lower sections, in quantities sufficient to cool the milk to a final temperature of 36 deg. F.

Milk coolers are of the surface type, built of stainless steel. Each cooler is 10 ft. 6 in. high and 8 ft. long. Except in dimensions, these coolers are similar in design to the milk heaters.

Milk from the coolers flows by gravity to a balance tank, located on a mezzanine in the filling room. From this tank, the milk flows, again by gravity, to any one of three bottle fillers.

Reference to the article in FOOD INDUSTRIES, September, 1938, page 496 and following, will indicate how cases of empty bottles are unloaded from incoming trucks. These empties are sent to the case storage by conveyor. This storage, located in the basement, will accommodate more than 75,000 cases of empty bottles.

As grade B milk only is bottled in this plant, the conveyor layout from case storage to bottle washers is very simple. All the cases of empties are brought to the washers on a single line of conveyor. This elevates the cases from the case storage room and passes them directly by the charging ends of the bottle washers. Here the bottles are removed and loaded into the washers by hand.

After the cases are emptied, they pass on, still on the same conveyor line, to the case washer. Washed cases, again on the same conveyor line, pass into the filling room to meet the filled bottles at the inspection points. After the cases have been loaded with filled bottles, the case conveyor takes them first to an icing station, and then to the chill boxes, as described in the article to which reference has already been made.

TWO BOTTLE WASHERS, each with a capacity of 180 bottles per minute, are installed in the plant. These are of the familiar high speed type. They discharge clean bottles automatically under inspection lights in the filling room, so that any imperfect bottles can be removed at this point.

From clean bottle inspection, the bottles move on stainless steel bottle conveyors to any one of three fillers. These fillers have a capacity of 132 bottles per minute each.

After filling, the bottles move through the automatic capping machines, then pass on bottle conveyors to the final inspection points, of which there is one for each filler. These inspection points also serve as collecting tables, from which the inspected, filled bottles are loaded by hand into the washed cases.

Two features of this pasteurizing and filling equipment should be noted. One is the result of the compact layout of all milk equipment. This results in the shortest possible length of sanitary pipe lines, with due allowance made for working space and future plant expansion. This effected a considerable saving in first cost. More important, however, is the saving in operating expense made possible through the relatively low requirement for labor when these pipe lines receive their daily thorough washing and sterilizing.

The other feature to note is the simplicity of the conveyor handling cases. One continuous run of conveyor is able to handle, as far as the loading point, all the cases needed for a daily capacity of over 300,000 qt. of milk. After filling, this conveyor branches into two main lines and one stub line, which serve all the chill boxes. In addition, the building layout permits handling of both filled bottle cases and empties with a minimum of raising and lowering, and hence is economical of power. The plant contains 1,690 ft. of case conveyor, operated by 7–3 hp. and 25–2 hp. motors. This is a total of 71 installed hp. to handle some 600,000 lb. of milk per day.

Regulations Proposed For Food Law Enforcement

Food manufacturers may offer suggestions and constructive criticisms

PROPOSED REGULATIONS for the enforcement of the Federal Food, Drug and Cosmetic Act have been issued by the Department of Agriculture. These concern all food manufacturers, and an opportunity has been afforded for people in the industry to make suggestions and constructive criticisms of the proposed regulations before they are promulgated. A public hearing will be held on Nov. 17, at 10 a.m., in the Department of Agriculture South Building, Washington, D.C. Manufacturers unable to journey to Washington for the hearing may present their views by letter before Nov. 24. The letter should be addressed to the U.S. Department of Agriculture, Office of the Secretary, Washington, D.C.

To bring before food manufacturers those sections of the proposed regulations which most affect their business, FOOD INDUSTRIES is publishing the following abstract:

Section 201 (m)—Labeling includes all written, printed or graphic matter accompanying an article at any time while such article is in interstate commerce or held for sale after shipment in interstate commerce.

Section 201 (n)—Among facts material in the light of a representation is the fact, when it exists, of a substantial difference of opinion as to the truth of such representation, among experts qualified by scientific training and experience to evaluate the truth of such representation.

Section 403 (a)—A food may be misbranded by reason (among other reasons) of the making of a false or misleading representation in the labeling thereof with respect to another food or a drug, device or cosmetic.

Section 403 (e) (1)—(a) If the food is not manufactured by the person whose name is stated on the label, the name shall be qualified by the words "Packed by—" or "—Packer" in case the name is that of the packer, or by "Distributed by—", "Packed for—" or "—Distributor" in case the name is that of the distributor. In case the packer or distributor of a food is also the grower thereof, the name of such packer or distributor may be qualified by additional words showing such fact.

Section 403 (e) (2)—(a) (1) The statement of the quantity of the contents shall reveal the quantity of food in the package, exclusive of wrappers and other material packed with such food.

(2) The statement shall be expressed in the terms of weight, measure, numerical count or a combination of numerical count and weight or measure, which are generally used by consumers to express quantity of such food and which give accurate information as to the quantity thereof. But if no general consumer usage in expressing accurate information as to the quantity of such food exists, the statement shall be in terms of liquid measure if the food is liquid, or in terms of weight if the food is solid, semisolid, viscous or a mixture of solid and liquid; except that such statement may be in terms of dry measure if the food is a fresh fruit, fresh vegetable, or other dry commodity.

(b) (1) A statement of weight shall be in terms of the avoirdupois pound and ounce. A statement of liquid measure shall be in terms of the United States gallon of 231 cu.in. and quart, pint and fluid ounce subdivisions thereof, and shall express the volume at 68 deg. F. (20 deg. C.). A statement of dry measure shall be in terms of the United States bushel of 2150.42 cu.in. and peck, dry quart and dry pint subdivisions thereof; or in terms of the United States standard barrel and its subdivisions of third, half and three-quarters barrel. However, in the case of an export shipment, the statement may be in terms of a system of weight or measure in common use in the country to which such shipment is exported.

(2) A statement of weight or measure in the terms specified in subdivision (1) of this paragraph may be supplemented by a statement in terms of the metric system of weight or measure.

(3) Unless an unqualified statement of numerical count gives accurate information as to the quantity of food in the package, it shall be supplemented by such statement of weight, measure or size of the individual units of the food as will give such information.

(c) Statements shall contain only such fractions as are generally used in expressing the quantity of the food. A common fraction shall be reduced to its lowest terms; a decimal fraction shall not be carried out to more than two places.

(d) (1) If the quantity of food in the package equals or exceeds the smallest unit of weight or measure which is specified in paragraph (b) of this regulation, and which is applicable to such food under the provisions of paragraph (a) (2) of this regulation, the statement shall express the number of the largest of such units contained in the package (for example, the statement on the label of a package which contains one quart of food shall be "1 quart," and not "2 pints" or "32 fluid ounces"), unless the statement is made in accordance with the provisions of subdivision (2) of this paragraph. Where such number is a whole number and a fraction, there may be substituted for the fraction its equivalent in smaller units, if any smaller is specified in such paragraph (b) (for examples, 1¾ quarts may be expressed as "1 quart 1½ pints' or "1 quart 1 pint 8 fluid ounces"; 1¼ pounds may be expressed as "1 pound 4 ounces"). The stated number of any unit which is smaller than the largest unit (specified in such paragraph (b)) contained in the package shall not equal or exceed the number of such smaller units in the next larger unit so specified (for examples, instead of "1 quart 16 fluid ounces" the statement shall be "1½ quarts" or "1 quart 1 pint"; instead of "24 ounces" the statement shall be "1½ pounds" or "1 pound 8 ounces").

(2) In the case of a food with respect to which there exists an established custom of stating the quantity of the contents as a fraction of a unit, which unit is larger than the quantity contained in the package, or as units smaller than the largest unit contained therein, the statement may be made in accordance with such custom if it is informative to consumers.

(e) The statement shall express the minimum quantity, or the average quantity, of the contents of the packages. If the statement is not so qualified as to show definitely that the quantity expressed is the minimum quantity, the statement shall be considered to express the average quantity.

(f) Where the statement expresses the minimum quantity, no variation below the stated minimum shall be permitted except variations below the stated weight or measure caused by ordinary and customary exposure, after the food is introduced into interstate commerce, to conditions which unavoidably result in decreased weight or measure. Variations above the stated minimum shall not be unreasonably large.

(g) Where the statement does not express the minimum quantity—

(1) variations from the stated weight or measure shall be permitted when caused by ordinary and customary exposure, after the food is introduced into interstate commerce, to conditions which unavoidably result in change of weight or measure;

(2) variations from the stated weight, measure, or numerical count shall be permitted when caused by unavoidable deviations in weighing, measuring, or counting individual packages which occur in good packing practice.

But under subdivision (2) of this paragraph variations shall not be permitted to such extent that the average of the quantities in the packages comprising a shipment or other lot of the food is below the quantity stated, and no unreasonable shortage in any package shall be permitted, even though overages in other packages in the same shipment or lot compensate for such shortage.

(h) A food shall be exempt from compliance with the requirements of clause (2) of section 403 (e) of the Act if—

(1) the quantity of the contents, as expressed in terms applicable to such

food under the provisions of paragraph (a) (2) of this regulation, is less than one-half ounce avoirdupois, or less than one-half fluid ounce, or (in case the units of the food can be easily counted without opening the package) less than six units; or

(2) the statement of the quantity of the contents of the package, together with all other words, statements and information required by or under authority of the Act to appear on the label, cannot, because of insufficient label space, be so placed on the label as to comply with the requirements of section 403 (f) of the Act and regulations promulgated thereunder.

Section 403 (f)—(a) (1) All words, statements and other information required by or under authority of the Act to appear on the label shall appear on the part or panel thereof which is presented or displayed under customary conditions of sale or distribution.

(2) If two or more such parts or panels are so designed as to render them likely to be so presented or displayed, each such part or panel shall bear all such words, statements and information.

(3) If the size of such part or panel, as limited only by the area of the package presented to view when such part or panel is directly viewed, is insufficient for all such words, statements and information to appear thereon with such conspicuousness and in such terms as to comply with the requirements of section 403 (f) of the Act, such part or panel shall be so extended around the package as to be sufficient for such purpose.

(b) The conspicuousness of a word, statement or other information required by or under authority of the Act to appear on the label may fail to comply with the requirements of section 403 (f) of the Act by reason (among other reasons) of—

(1) the position on the label of such word, statement or information;

(2) the limiting of label space for such word, statement or information through the use of such space for any word, statement, design or device which is not required by or under authority of the Act to appear on the label; or

(3) the limiting of label space for such word, statement or information through the use of such space to give materially greater conspicuousness to any other word, statement or information.

(c) No exemption depending on insufficiency of label space, as prescribed in regulations promulgated under section 403 (e) (2) or (i) (2) of the Act, shall apply if such insufficiency is caused by—

(1) the use of label space for any word, statement, design or device which is not required by or under authority of the Act to appear on the label; or

(2) the use of label space to give greater conspicuousness to any word, statement or other information than is required by section 403 (f) of the Act.

(d) If any part of the labeling is in a foreign language, all words, statements and other information required by or under the authority of the Act to appear on the label or labeling shall appear thereon in both the English language and the foreign language.

Section 403 (i) (2)—(a) The name of an ingredient (except a spice, flavoring or coloring which is an ingredient of a food other than one sold as a spice, flavoring or coloring), required by section 403 (i) (2) of the Act to be borne on the label of a food, shall be a specific name and not a collective name. But if an ingredient conforms to a definition and standard of identity prescribed by regulations under section 401 of the Act, such ingredient may be designated on the label of such food by the name specified in the definition and standard, supplemented, in case such regulations require the naming of optional ingredients present in such ingredient, by a statement showing the optional ingredients which are present in such ingredient.

(b) No ingredient shall be designated on the label as a spice, flavoring or coloring unless it is a spice, flavoring or coloring, as the case may be, within the meaning of such term as commonly understood by consumers. The term "coloring" shall not include any bleaching substance.

(c) An ingredient which is both a spice and a coloring, or both a flavoring and a coloring, shall be designated as spice and coloring, or flavoring and coloring, as the case may be, unless such ingredient is designated by its specific name.

(d) A label may be misleading by reason (among other reasons) of—

(1) the order in which the names of ingredients appear thereon or the relative prominence otherwise given such names; or

(2) its failure to reveal the proportion of, or other fact with respect to, an ingredient, when such proportion or other fact is material in the light of the representation that such ingredient was used.

(e) (1) A food shall be exempt from the requirements of clause (2) of section 403 (i) of the Act if all words, statements and other information required by or under authority of the Act to appear on the label of such food, cannot, because of insufficient label space, be so placed on the label as to comply with the requirements of section 403 (f) of the Act and regulations promulgated thereunder. But such exemption shall be on the condition that the exemption with respect to stating the quantity of the contents, as prescribed by regulation (h) (2) promulgated under section 403 (e) (2) of the Act, shall first have been applied, and on the further condition that, if the package is of such size that sufficient space is available to state legibly thereon all the information required by such clause (2), such information shall be so stated as prominently as practicable, even though the statement is not of such conspicuousness as to render it likely to be read by the ordinary individual under customary conditions of purchase.

(2) In the case of an assortment of food, when variations in the ingredients in different packages packed from such assortment normally occur in good packing practice, such food shall be exempt from compliance with the requirements of clause (2) of section 403 (i) of the Act with respect to any ingredient which is not common to all packages. But such exemption shall be on the condition that the label shall bear, in conjunction with the names of such ingredients as are common to all packages, a statement in terms which are as informative as practicable and which are not misleading, indicating that other ingredients may be present.

Section 403 (k)—(a) (1) The term "artificial flavoring" means a flavoring containing any sapid or aromatic constituent, which constituent was manufactured by a process of synthesis or other similar artifice.

(2) The term "artificial coloring" means a coloring containing any dye or pigment, which dye or pigment was manufactured by a process of synthesis or other similar artifice, or a coloring which was manufactured by extracting a natural dye or natural pigment from a plant or other material in which such dye or pigment was naturally produced.

(3) The term "chemical preservative" means any chemical which, when added to flood, tends to prevent or retard deterioration thereof.

(b) A food which is subject to the requirements of section 403 (k) of the Act shall bear labeling, even though such food is not in package form.

(c) A statement of artificial flavoring, artificial coloring, or chemical preservative shall be placed on the food, or on its container or wrapper, or on any two or all of these, as may be necessary to render such statement likely to be read by the ordinary individual under customary conditions of purchase and use of such food.

(d) A food shall be exempt from compliance with the requirements of section 403 (k) of the Act if it is not in package form and the units thereof are so small that a statement of artificial flavoring, artificial coloring, or chemical preservative, as the case may be, cannot be placed on such units with such conspicuousness as to render it likely to be read by the ordinary individual under customary conditions of purchase and use.

Section 405—(a) (1) An open container is a container to which no cover is attached or fitted, and which is unwrapped.

(2) An open container of a fresh fruit or fresh vegetable, the quantity of contents of which is not more than four dry quarts, shall be exempt from the labeling requirements of paragraphs (e), (g) (2) (with respect to the name of the food specified in the definition and standard), and (i) (1) of section 403 of the Act.

(b) Except as provided by paragraphs (c) and (d) of this regulation, a shipment or other lot of a food which is, in accordance with the practice of the trade, to be processed, labeled or repacked in substantial quantity at an establishment other than that where originally processed or packed, shall be exempt, during the time of introduction into and movement in interstate commerce and the time of holding in such establishment, from compliance with the labeling requirements of section 403 (c), (e), (g), (h), (i), (j) and (k) of the Act if—

(1) the person who introduced such shipment or lot into interstate commerce is the operator of the establishment where such food is to be processed, labeled or repacked; or

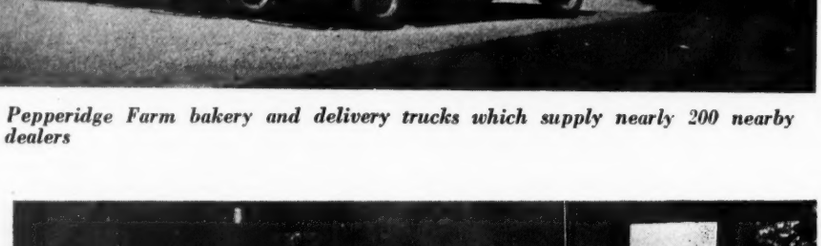
(2) in case such person is not such operator, such shipment or lot is delivered to such establishment under a written agreement, signed by and containing the postoffice addresses of such person and such operator, and containing such specification for the processing, labeling or repacking, as the case may be, of such food in such establishments as will insure, if such specifications are followed, that such food will not be adulterated or misbranded within the meaning of the Act upon completion of such processing, labeling or repacking. Such person and such operator shall each keep a copy of such agreement until all of such shipment or lot has been removed from such estab-

(*Turn to page 636*)

Consumers Will Pay For QUALITY

By IVAN C. MILLER
Distribution Editor, FOOD INDUSTRIES

Pepperidge Farm bakery and delivery trucks which supply nearly 200 nearby dealers



The kitchen where ingredients are measured and mixed

WHEN A BAKERY increases its output from 100 loaves of bread per week to 11,000 per week in its first year it is an accomplishment worthy of note. When, however, such an accomplishment is made selling a 24-oz. loaf to retail at 25 cents, the feat is deeply significant, not only to the baking industry but also to the entire food industries.

In August, 1937, the Pepperidge Farm Bakery, Fairfield, Conn., was little more than a kitchen endeavor baking 100 loaves of grist-mill-ground, germ-containing, whole wheat bread. The market for this bread was not solicited. The bread was baked for insistent doctors who needed the product for the diet of patients requiring special nourishment. Demand quickly came from friends of patients—people sound and healthy. Pepperidge Farm bread then was offered to the public, made according to the same recipe—quality unchanged—at 25 cents per loaf. Sales on the first anniversary were 11,000 loaves per week.

Pepperidge Farm bread is made of the same wheat as millions of other loaves that reach the American dinner table every day, Northwestern hard spring wheat. Pepperidge bread at 25 cents per loaf has an enviable acceptance—a rapidly mounting sales curve. Many other breads made from the same wheat and selling at 8, 9 and 10 cents per loaf, find indifferent acceptance—maintain a level sales volume only through the aid of premiums or costly promotion. The difference between the 25-cent Pepperidge loaf and the 8, 9 or 10 cent loaf is not all profit. Old Pepperidge customers remain customers only because the product is worth the price. The bread has for these customers a quality not obtained for a lesser price.

The Northwestern wheat used in Pepperidge bread is milled in Connecticut burr stone mills. Few of these land marks are left anywhere in the country. Their capacity is limited. The germ-containing whole wheat flour for Pepperidge bread comes fresh from the grist mill every day, not because of the limited capacity of the mill, but because the best quality

The first Pepperidge Farm Bread was "natural whole wheat." Raisin whole wheat and white bread have since been added.

bread can be made from freshly ground wheat. The vitamin content of the germ in whole wheat flour diminishes with the time between grinding and baking. Rancidity of germ oil will develop as the whole wheat flour ages.

It is expensive to bake with daily ground flour but it is an asset to quality. It is also costly to bake with whole milk, pure fresh butter and honey, but these are also necessary to the quality which alone is responsible for the growing acceptance of a 24-oz. loaf of bread retailing at 25 cents.

Pepperidge Farm bread made from finely ground whole wheat is a small compact loaf—smaller than other loaves of the same weight. It slices thinner and stales much less rapidly. Nearly 400 loaves of bread go to customers each week by mail, some as far west as Wisconsin, Oklahoma and even California, reaching customers in some places as much as three to five days after baking. The long standing uncancelled mail orders are evidence of the keeping quality of the bread. To be consumed, much of the mail order bread must stay fresh from five to eight days after baking.

In Connecticut and nearby New York, some 200 retail outlets are served by four trucks. More distant places receive bread shipments by express. Retailers are generally boosters. Pepperidge bread is never a "loss leader," but a grocery item sold at a fair profit. Dealers are not overstocked, rather limited to established minimum requirements. Consequently, returns are rare.

In the August, 1938, issue of *Vogue* under the column "Tours with the Gourmet" appeared the following: "The bread we are about to acclaim is hailed with panegyrics by epicures. This is the Pepperidge Farm bread made of fresh stone-ground whole wheat. It started its career as a health bread and is still important as such since it is recommended by many physicians in dietary regimes. But we are writing about it because it is so wonderfully good to eat."

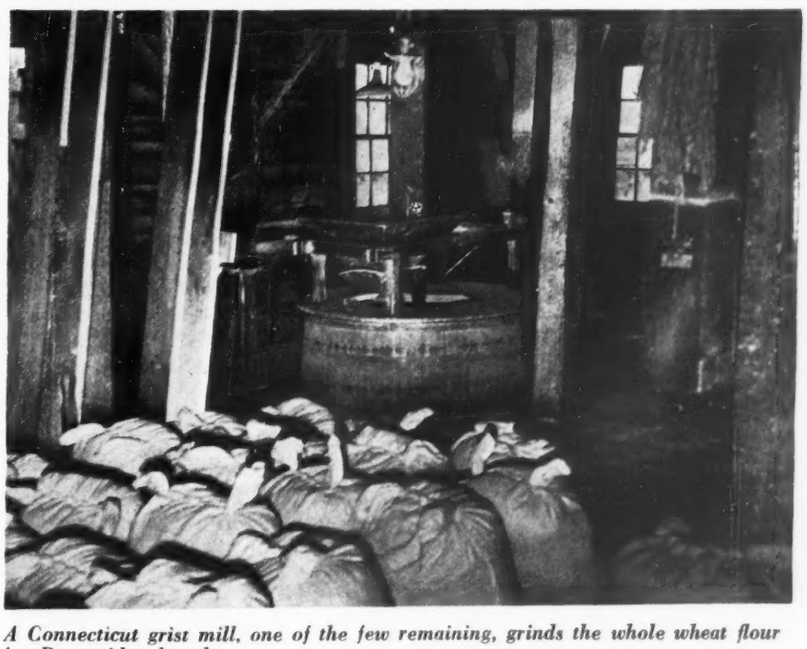
A columnist in a western city who read the above in *Vogue* wrote to the bakery inquiring about the bread and its price. After sampling a mailed loaf of bread the columnist described it in her column, which she concluded by saying that she wanted to continue using the bread but could not use six loaves, the minimum shipment. She asked if any of her readers were interested in buying regularly the remaining five loaves of quality bread at a quality price. Within a few hours after the morning paper was delivered, 35 orders were received; by night, 80. The orders still stand.

What better proof could be asked that a demand exists for quality food. This market is large, it is not confined to any income group, but is a part of every income group. It will pay a price commensurate with the quality of the product.

It is unlikely that, either in the territory served by Pepperidge Farm Bakery or in any other market, for that matter, there is room for other bread products of similar quality and price. There is, however, ample evidence that there is a large market throughout the country anxious for better quality in bread and willing to pay a proportionate price for the better quality.

For years the per capita bread consumption has declined. Relative prices have kept fair pace. What about quality? No small part of the whole market is willing to pay for the quality it wants.

Pepperidge Farm bread got its start because doctors recognized its nutritive value. By many thousands today Pepperidge Farm bread is not bought and eaten for its nutritive value alone, but because of its texture, taste and long-lived freshness. There is a large market in this country for quality.



A Connecticut grist mill, one of the few remaining, grinds the whole wheat flour for Pepperidge bread.

Unreached Markets for Bakery Products

MAPLEWOOD, N. J.—Eugene Szepesi's portrayal of the "Unreached Markets for Bakery Products", which appeared in several recent issues (April, May, June, 1938), of FOOD INDUSTRIES, might well be considered somewhat in the light of that famous biblical character Moses, who led the children of Israel out of their doldrums to the promised land. It has been quite generally recognized since the beginning of this century, and particularly since the World War, that the per capita consumption of bread has not kept pace with the increased growth in population. In 1900, flour consumption per capita was about 225 lb.; by 1916 it had dropped to 200 lb.; and by 1937 had fallen off to 156 lb. This was a drop of 75 lb., or 33 per cent during the years of 1900 to 1938, while the population increased from 75 to 130 million.

CONDITIONS SINCE 1900 have materially changed, both in our mode of living and the manner in which bread is baked. In the early days each family baked its own bread as it was required. Now most of the bread is made in commercial bakeries, and many changes have taken place in the methods of production in these plants during the past decade. Some claim that while the production has increased, this has often been at the sacrifice of flavor and quality.

Whether or not the total bread market has just about reached the saturation point, as mentioned in a recent article in *Fortune Magazine* (July, 1938) on "Wonder Bread and the Circuses", is problematical. Just why the ratio between the growth in population and the consumption of bread (or flour) per capita has not remained constant is a matter of considerable controversy. Various reasons have been advanced for this decline, such as: (a) less strenuous physical labor, not requiring the same number of calories; (b) increasing use of sugar, dairy products, vegetables, fruits, fruit juices, dry cereals, and other food products; and (c) the growth of the fallacy that bread is fattening, even though scientists and dietitians maintain that it is not fattening, and recommend that bread should be eaten to maintain a properly balanced diet.

For the baking industry to continue much as it has done heretofore will undoubtedly result in a further decline in consumption of bread per capita. Instead of bemoaning the decline in bread consumption, and scrapping about pan sizes at conventions when they get together, why not take a leaf from the experience of other producers of foods. For example, why do people, especially those around middle age, eat so many oranges and grapefruit? Because the doctors and citrus growers have put the story across that oranges and grapefruit help to ward off arthritis and rheumatism.

The so-called "falling off" in per capita flour consumption has been a matter of grave concern to both the milling and baking industry. The milling industry was the first to take steps in order to check and correct the situation when they recently created the Wheat Flour Institute. The baking industry, in an endeavor to check the decline and promote the consumption of their own bakery products, recently created an organization known as the Department of Nutrition, functioning through its technical branch, the American Institute of Baking.

Both the milling and baking industry are now facing the cross-roads of their destiny as pointed out in "Baking for Profit" appearing in February, 1938, in *Northwestern Miller and American Baker*. For if these industries are to continue much as they have done heretofore, there will undoubtedly be a still further decline in both the flour consumption per capita and that of bakery products. However, if they will continue to carry on and extend their several cooperative educational and merchandising campaigns, as well as improve the flavor and increase the variety of their bakery products, then Szepesi's portrayal of the still unreached $500,000,000 potential market will become a reality during the near future.

FOR EVERY FAMILY INCOME LEVEL there is a minimum and maximum amount that can be spent for food. Whenever an increase or decrease takes place in the family's income, the food budget will automatically adjust itself to include or exclude such foodstuffs as have the greatest appeal to the family consistent with the funds available. For bakery products, Szepesi has found this to be tops at $94.67 per year in the District of Columbia, where the average earning power is high in a densely populated area, and low as $12.21 in New Mexico, where the average earning power is low in a sparsely settled country. In the state of New York a fair quota for baked products is $83.00 per year per family, while the actual amount spent was only $60.00 per year per family. Here is a typical instance where the difference may be readily recaptured for the baking industry through an increased variety of more tasty goods.

THE RATE at which French, Italian, German and Scandinavian breads are eaten in their several countries (about 40 per cent more per capita than in this country), and the rate at which breads of this same character are eaten in this country in the better class of eating places, shows that the general public still appreciates and will eat good bakery products.

Today a housewife is swayed more by the flavor than the looks of the bread. Many housewives find that their families get so "dreadfully tired of the same kind of bread". It has no appeal to the children, they say, unless camouflaged with good sandwich spreads.

It is gratifying to observe that some bakers have already sensed the housewife's demands, and are beginning to capitalize on the future which Szepesi portrays. In those localities where the bakers have made a study of the housewives' demands and have produced greater variety if bakery products and better bread, by using different compositions and treatment of doughs, as well as increasing the baking time, a loaf of bread has been produced that has much of that same delicious flavor that mother's bread possessed. Even though this bread does cost more to produce, it readily sells for more, with a substantial margin of profit and no returns to be considered.

Numerous such instances have been discovered by the writer in various parts of the country, and many people have been found who will drive several miles to get a variety of properly baked and well-flavored bakery products, for which they gladly pay an increased price. The number of bakers sensing the opportunities pointed out by Szepesi is rapidly increasing. Among those who have had spectacular growth is Pepperidge Farm Bakery at Southport, Conn., described on page 630 of this number of FOOD INDUSTRIES.—V. C. KYLBERG.

Rigid Quality Control *Makes Mixes Good*

From formula to finished product, the production of satisfactory mixes involves a multitude of problems in technology and engineering

By LOUIS E. DIETRICH
P. Duff & Sons, Inc., Pittsburgh, Pa.

Four prominent members of the Duff family of mixes. All are packaged in foil-wrapped cartons as a protection against insect infestation while on the grocer's shelf.

BECAUSE MIXES are comparatively new products, their successful manufacture involves some acute problems in food technology and engineering. The difficulties that arose in evolving the ginger bread mix of P. Duff & Sons, Inc., Pittsburgh, formed the basis of a series of four patents. In addition, the job of transferring laboratory technics into plant-size processes required a long search for suitable machinery and other equipment. Although today many of the basic manufacturing procedures are established, every mix still presents a special set of problems. These minor problems are varied in nature, usually relating to keeping quality and the compatibility of ingredients from a chemical standpoint, and a vast amount of experience is necessary if trouble is to be avoided. At present, for the inexperienced to essay the production of a line of mixes is somewhat akin to grabbing a wildcat by the tail.

Specifically, the problems of mix manufacture may be discussed under four headings: (1) formula, (2) control of ingredients, (3) actual compounding and (4) packaging. These problems will be discussed from the standpoint of complete cake mixes, but the principles involved relate generally to all types of mixes.

Selection of the formula for a mix is of prime importance. This should be made the subject of painstaking research, for it is ultimately upon the formula that the success of the product depends. Clever merchandising may produce first sales for almost any product, but lasting success, based upon continued use, is only possible when a mix produces a finished food of sound quality. It is here that many mix manufacturers have erred. They have depended solely upon the convenience and novelty of the mix idea to carry the products through and have not paid enough attention to the character and quality of the finished food.

The character of many foods varies from one locality to another. The ginger breads made in the deep South are different from those of New England. Chocolate and devil's food cakes may vary in color from almost black to a light brown, with corresponding differences in flavor. Certain flavors are popular in some sections and either unknown or disliked in others. These facts mean that the formula of a successful mix must be evolved to level these differences and strike an average between extremes of flavor, texture, color and so forth. In order to enjoy popularity in widely distant localities, a mix must produce a finished product that is unlocalized in character but which is a good example of its type. Often a fair amount of research must be gone through before this can be done, before the true standard of the type can be found.

Theoretically, a complete mix can be compounded to produce almost any food that is composed of a number of separate ingredients. The actual formulation of a practical mix, however, evolves considerably more than simply reducing the necessary ingredients to a dry state and mixing them together. Often, traditional technics must be disregarded and compensation made for effects derived from the old-fashioned individual treatment of ingredients. In the case of cake mixes, for example, the traditional maker might say they were impossible because the shortening ingredient does not get creamed with the sugar and the eggs do not get independently beaten. Therefore, the artistry of the baker is of little value in formulating mixes when they seem to violate his most essential principles. A specialized skill that can only be obtained by experience in this field is required.

An average cake recipe calls for a combination of about twelve ingred-

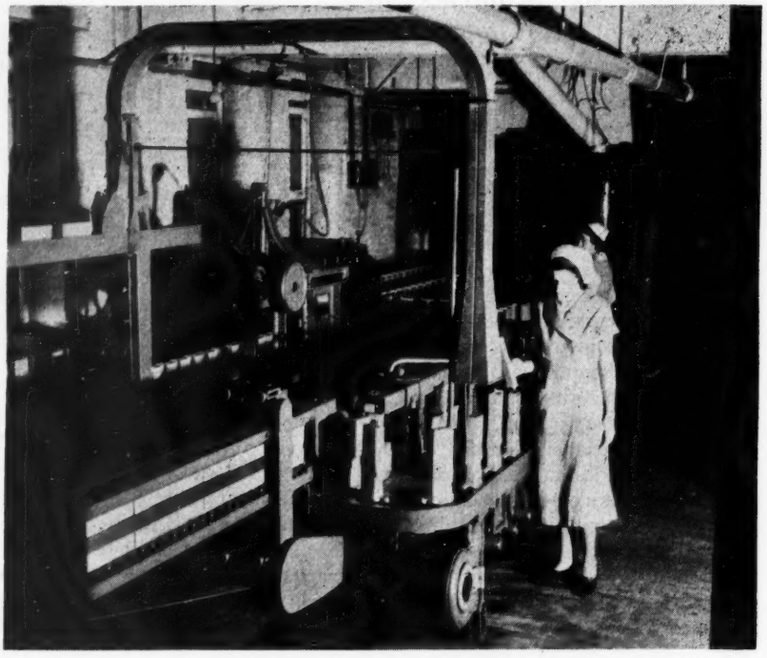
▶ ***Wisely chosen and carefully followed methods of production, inspection and testing assure high quality in the finished product of the mix manufacturer. The principles and many of the details of these methods might well be utilized by***

Food Engineers
Food Manufacturers
Food Technologists

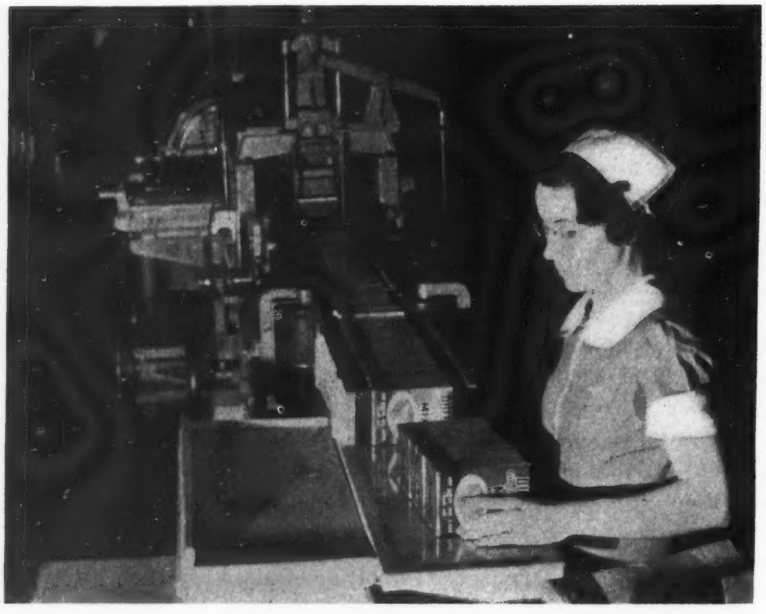
ients, to be put together in a certain order. A complete cake mix, therefore, must contain all of these ingredients in amounts balanced so as to compensate for the difference between the operation of a mix and the old-fashioned methods. In a mix, for instance, the leavening effect must come almost wholly from gas-evolving agents, whereas in the traditional methods of cake making, some of this effect is obtained by air inclusion through whipping and creaming. Therefore, leavening agents in a mix must be increased to a percentage above what would be expected from a study of ordinary cake formulas. In addition, the ingredients must be so chosen and blended that they will exist together in an active and uninjured form for a reasonable time. In other words, keeping quality must be built into the mix. The difficulties here are apparent when it is realized that certain groups of ingredients tend to go through complicated and little-understood chemical reactions. A detailed discussion of these matters, involving both enzymic and chemical changes in flour proteins, antioxygenic effects of various substances, catalytic rancidity and so on, is beyond the scope of this article. It is evident, however, that the evolution of a successful mix formula is a laboratory job of some complexity.

Much of the actual work involved in arriving at a good formula must still be done by trial and error methods because our knowledge of the interplay of ingredients, under long storage, is as yet only fragmentary and not organized into rules. It is slow work, too, because even under accelerated aging conditions it may take several months before the results of experimentation can be known. It is to be expected that as experience in the fabrication of mixes accumulates, formula building will become simpler.

It is perhaps unfortunate that so many formulas for mixes are being made available by producers of ingredient materials. Even housewives have been busy evolving mix formulas to submit to possible manufacturers. Many of these produce mixes that can be readily recognized as inferior. Others look attractive at first sight. Practically all of them are uneconomical or over-balanced in favor of one ingredient. It is doubtful whether the problems sketched above have been given consideration in these ready-made formulas, and their blind acceptance is dangerous. At least they should



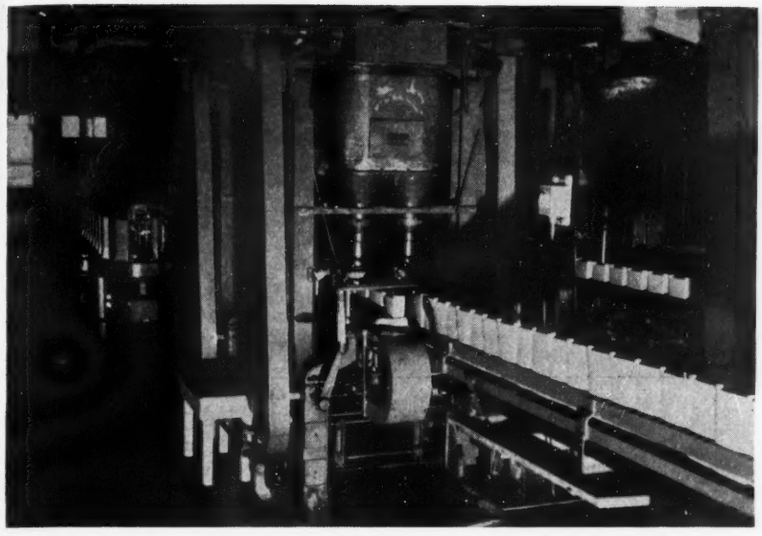
Forming cartons for Duff's mixes.



Cartons of ginger bread mix coming off the packaging line at the Duff plant in Pittsburgh.

be tested before adoption by making them up and storing the mixes for six months under grocery-store shelf conditions. If the mix then makes a good product, the formula may have some merit.

The control of the quality and uniformity of ingredient material is very important in successful mix manufacture. If the formula chosen is a good one, it will necessarily be delicate and will not stand much variation of raw materials. Complete mixes are among the most delicately constituted food products manufactured today. There are two reasons for this. First, the foods for which mixes are made are usually complicated and hard-to-make items of multiple ingredients. Few foods require more care and skill in the making than rich cakes, puddings or candies. The second reason for the delicacy of the mixes is the fact that they do not leave the manufacturing plant in the form in which they are consumed, but require further process-



Filling packages in the mix department at Duffs.

ing by the consumer himself. It is not only necessary to produce a mix that gives good results when used correctly, but also one that is nearly foolproof or that has a wide enough tolerance to stand up under some abuse.

An idea of the delicacy of adjustment necessary in cake mixes may be obtained from a consideration of the following facts: In a certain mix for molasses cake, a shift from 0.40 per cent sodium bicarbonate in the batter to 0.70 per cent will cause an almost complete change in the character of the cake; in some formulas, a variation of 10 per cent in the sugar-flour ratio will so unbalance the mixture that a good cake is turned into a very poor one.

In mixes for white cake, definitely off-color crumb results when the batter is given a slight alkaline reaction, while in certain other types of cake an alkaline mixture is desirable. All of these facts show the need for close control of uniformity of raw ingredients. To accomplish this, an entire system of inspection, laboratory evaluation and the making of practical trial batches must be built up. Probably separate discussions of some of the most common ingredients of cake mixes will best serve to illustrate the specific problems involved.

FLOUR is an ingredient of all cake mixes and must be carefully watched. Appreciable variations in the character of the flour can cause disturbances in volume, shape, texture, color and so on in the cake from a well balanced mix. The absorption, or amount of water the flour absorbs to produce a dough of standard consistency, must be kept constant. Variation in this may render inaccurate the directions furnished the consumer as to how much water to add to make the batter. Keeping quality of the mix may be affected by the age of the flour and by the type of bleaching process used. Luckily, flour unvarying in uniformity from year to year can be had today if it is purchased from a reputable and experienced miller. It is not well, however, to depend entirely upon the miller for complete insurance against trouble caused by flour. Some system of checking quality and suitability and to guard against the errors of suppliers must be employed, especially when more than one type of flour is used in the plant. P. Duff & Sons has adopted the system of checking the analysis of each new car and making a complete test run of a mix before it is permitted to enter the regular mixing rooms.

Sugar is also an ingredient of all cake mixes. Problems of quality control of this material are principally concerned with degree of fineness and freedom from lumping in fine sugars and with color and moisture content in browns. When the sugar goes into a mix without previous solution (as in a dough), care must be taken that the granulation is fine enough to permit the individual crystals to dissolve completely while the batter is being made and before the cake gets into the oven. Also more or less surface, as desired, can be provided for the absorption of shortening by the regulation of particle size in the sugar.

Shortening is another ingredient common to all cake mixes. Generally, the plastic, hydrogenated types are employed, but oils or other forms may be used in some cases. Various types of powdered shortenings are offered to mix manufacturers for the purpose of simplifying incorporation, but they are usually found lacking in actual shortening value. It is primarily essential that the shortening material have a high resistance to rancidity. Beyond this, the evaluation is difficult, except by trial and error methods, because in mixes the significance of some of the usual criteria of judgment is lost. It is mostly with respect to the use of the shortening that the technic of making cakes from mixes departs so radically from traditional procedures. In mixes, the creaming value of a shortening has no direct significance. Spreading ability, emulsifying power, plasticity and presence of substances liable to react unfavorably with flour are all important.

IMPORTANT effects on the quality of a mix result from the correct use of egg material. Generally, powdered egg products are employed, and the control of the quality of these materials follows usual lines, at least with reference to determinations of freshness and freedom from adulteration. Dried albumen, dried yolk and dried whole eggs are all used, either separately or in combination. Albumen exerts a potent effect on structure of the cake crumb, giving strength which, if allowed to be overdone, will produce toughness. Yolk material contributes emulsifying power in cake batters, tending to increase volume and tenderness or "featheriness" in the finished product. Yolk material, however, if not correctly controlled, can produce serious deleterious effects in a mix through a reaction of some of its constituents with the flour. Whole egg solids, of course, exert a combination of the effects of albumen and yolk. The efficiency of all dried egg products is dependent upon their history and probably upon the method of drying. Certain exclusive manufacturing processes employed by P. Duff & Sons permit the direct use of fresh shell eggs rather than the previously dried materials.

These discussions, of course, have only touched upon a few common mix ingredients. There are many others, such as molasses, leavening agents, chocolate and cocoa, milk, spices, salt, flavoring oils, nuts, raisins, and so on, that require care in selection and special control in use.

In the simplest case of mix production, the only factory operation involved, aside from packaging, is mixing. In this case, all the ingredients must be obtained in a dry powdered form and require only to be blended together in the percentage dictated by the formula. Generally, however,

(Turn to page 660)

Home Economists

. . . We like them when they don't pull their punches

SYRACUSE, NEW YORK—Frankly, your idea about home economists as expressed in the July number of FOOD INDUSTRIES is quaint and—yes, as you say, miles behind the times! I should be inclined to suspect that your usually pleasant disposition had been slightly soured by the deluge of applicants for jobs, but I know that a great many other intelligent gentlemen, otherwise well-informed, share your misapprehension about this whole matter of Home Economics. May I offer a little unasked for education? Of course you don't have to read it, but I rather hope you will.

It is true that the original function of Home Economics was "to make better home-makers, either through their own efforts or by teaching the subject in secondary schools" and this is still one of its functions and perhaps ultimately the most important. But, as no one should know better than you, industry has driven women out of the home, at least for the pre-marriage years during which parents have come to expect their daughters to be self-supporting. The teaching field cannot be expected to absorb all the surplus daughters, let alone those who are still hopefully waiting, so what more natural than that these should follow what has always been supposed to be their proper vocation into the industries which have taken it over?

Following this line of reasoning the schools and colleges of Home Economics have for a number of years (I won't embarrass you by saying how long) been offering courses intended to prepare such students as wished it for business careers, and I assure you that we fully realize that this takes more than ability to whack up a good meal. In fact, our Syracuse graduates who plan to enter business are required to take very thorough courses in all of those subjects that you refer to as indispensable, with at least a year of advanced economics in addition.

If your patience has held out this far, I should like to try it still further by quoting from an admirable and authoritative book entitled, *"Business Opportunities For The Home Economist,"* by Chase Going Woodhouse, published by McGraw-Hill Book Company.

"Slowly we are evolving a picture of an economic world which will not center so violently on struggle and strife, or competition. There are persons, still too few, who are trying to show us that labor and capital have fundamentally the same interests, that in the long run they would gain more by working together than by fighting. Trade associations are proof that producers of the same type of commodity see interests in common, whereas last century they saw only competition. And now we are looking toward a negation of the age-long doctrine of *caveat emptor,* to a new relationship between consumer and producer. And what more natural than that home economics trained women should play a leading role in this bringing of business and the home closer together, in providing what the home needs, in short, in helping superhousekeeping function for the welfare of the community family?

"Business is finding a variety of places for the woman with home economics training and with the right personal qualifications—in foods manufacturing and distribution; in the dairy industry; in tearooms, restaurants, cafeterias, and hotels; in textile firms; drycleaning establishments; laundry associations and in firms producing cleaning supplies; in testing laboratories; on newspapers and magazines; in the garment trade; in advertising work; in department stores; as consultant; in an advisory capacity in banks or stores; in public utilities and in firms manufacturing or distributing household appliances and equipment; and, to a still limited extent, in housing.

"On the whole, she is more likely to be employed in the large cities and in the Middle Atlantic and East North Central states. However, with her numbers expanding in the utilities she is becoming a factor in other sections, notably the West North Central, the South Atlantic, and the Pacific sections, and in the smaller communities. Her numbers may well be expected to increase in all the fields except, perhaps, in journalism where a few women can supply material for a large number of newspapers through the syndicates."

"Now, is this a flash in the pan? A passing fad? Or is it an outcome of economic factors which has some promise of development? Quite decidedly it is this last. Why? . . .

"It has been increasingly recognized since the depression that the immediate problem of industry is not only to produce more and so make possible a higher standard of living for everyone, but also to find buyers for the current output. This involves the broad social problems of getting purchasing power into the hands of the consumer and the more specific problem of making goods which consumers want and distributing them in ways which will induce customers to buy. It is in this more specific field that the home economist is being called on for a direct professional contribution."

As to your own personal grievance, the deluge of Home Economists looking for jobs, after all they do have to look, don't they. One Home Economics woman who now holds an important and highly paid position in business applied for one hundred jobs the month after she graduated and landed the hundred-and-first. We do need a liason officer between Home Economics and industry—why shouldn't FOOD INDUSTRIES be it?

And finally, next time you come to Syracuse won't you visit us and find out for yourself what a four-year College of Home Economics with power to make its own curriculum really does? — ANNIE LOUISE MACLEOD, *Dean, Syracuse University.*

Regulation Proposed For Food Law Enforcement

(*Continued from p 629*)

lishment, and shall make such copies available for inspection.

(c) An exemption of a shipment or other lot of a food under clause (1) of paragraph (b) of this regulation shall, at the beginning of the Act of removing such shipment or lot, or any part thereof, from such establishment, become void *ab initio* if the food comprising such shipment, lot or part is adulterated or misbranded within the meaning of the Act when so removed.

(d) An exemption of a shipment or other lot of a food under clause (2) of paragraph (b) shall expire—

(1) at the beginning of the act of removing such shipment or lot, or any part thereof, from such establishment if the food comprising such shipment, lot or part is adulterated or misbranded within the meaning of the Act when so removed; or

(2) upon refusal by the person who introduced such shipment or lot into interstate commerce, or by the operator of the establishment where such food is to be processed, labeled or repacked, to make available for inspection a copy of the agreement, as required by such clause.

LOCKER PLANTS . . .

A New Food Industry

PART II

By IVAN C. MILLER
Distribution Editor, FOOD INDUSTRIES

Containers used for storing frozen foods in locker plants. Papers and liners are not shown.

THE LIMITED SERVICE LOCKER PLANT described in the September issue of FOOD INDUSTRIES is an important extension of service of ice and cold storage plants, cheese factories and dairies. The complete or full service locker plant is a new industry. It manufactures, it sells service and products. It is a producer-to-consumer project, operated on a local community basis. The development of the industry is significant and important to every food manufacturer, to wholesalers and to retailers.

Just a few years ago, a man with courage and vision, even though he may have been sold an idea, erected in the dust bowl area of Kansas a new modern full-service locker plant. In one room of the plant, thermostatically controlled to maintain a uniform temperature of 0 deg. F. was installed 350 white enameled steel lockers. These lockers were to furnish a place for nearby farmers and the townspeople of the little community to store a supply of frozen foods throughout the year.

Another room in the new plant, also thermostatically controlled at 34 to 35 deg. F. was ready for storing sides and quarters of meat for a three to six weeks' period of aging. Next to the locker storage room was a cutting room equipped with complete butcher's equipment including power saws and power meat grinders. Here the aged meat was to be cut into steaks, chops, roasts or ground for hamburger or loaf, weighed, wrapped and labeled for further treatment. Off this room was another room, walled with 7 to 9 in. of cork insulation, also thermostatically controlled to maintain a temperature of—20 deg. F. In this smaller freezer room air circulated over a mass of direct expansion coils, pushed by fans. In this room meats, fruits, vegetables and fowl were to be quick-frozen before going into storage in the lockers. Not only the office, lobby and rest room were attractive, clean and sanitary, but so was all working space as well.

When this plant, typical of the 500 full service locker plants in the country, was ready everyone within 30 miles of the plant was mailed a series of letters and booklets, explaining the advantages of the locker plant system to the families in the district. These were some of the services and advantages the locker plant offered.

1. A farmer might slaughter meat or poultry at any time of the year, bring his slaughtered product to the locker plant, have it aged to a quality better than could be purchased at retail, cut for table use, packaged, quick-frozen and placed in always accessible storage for further use, as needed. All this for a locker rent of from $8 to $10 per year and a service fee of from 1 to 1½ cents per pound of meat processed. Users of the lockers were assured, depending of course on the volume of frozen foods stored during the year, of savings of from $50 to $100.

2. Locker storage facilities would provide the users with a place and a means for storing fruits and vegetables, preserved by quick-freezing in a fresh state, thus eliminating the inconvenience and drudgery of home-canning.

Two months after the opening of the plant, and after all prospective users had been repeatedly advised of the advantages, the only things frozen were the owner's assets—the lockers were empty. The owner, still with courage, but doubting his vision, checked up on his doubtful enterprise by calling on his unresponsive prospects.

(Turn to page 640)

POSTERS PROMOTE *Christmas!* SALES

Ladies' Home Journal

Upper: These pages will appear in December in Pictorial Review-Delineator
Lower: McCall's December food pages

These food pages, which will be featured in the forthcoming December issues of women's magazines, may be used as display posters to promote holiday impulse sales

IF YOUR PRODUCT is featured in the December issue of one of the women's magazines (advance proofs reproduced on these pages), posters bearing reprints of the page illustrating your product, used as the center of an impulse sales display in retail outlets, will materially increase sales of your product in those outlets.

Results obtained from tests made with the cooperation of both independent and group retail organizations have been reported in earlier issues of FOOD INDUSTRIES. These tests have proved two facts. Retailers generally welcome this type of poster more than other types, and cooperate in giving it an opportunity to produce. This type of poster, made by mounting reprints of the illustrated food pages of the women's magazines, produced pronounced increases when used to stimulate sales.

As a result of these tests FOOD INDUSTRIES arranged with the woman's magazines to obtain advanced proofs of these pages. The purpose of obtaining these advanced proofs is to

food pages for December

describe and illustrate the forthcoming food pages of the women's magazines so that manufacturers whose product or products are among those featured may obtain ready-for-use posters bearing reprints of the food pages and place them in the hands of retailers at or about the same time the magazines reach their readers.

Mounted reprints of these food pages (single pages on 14x22 in. poster board, spreads on 28x22 in. poster board) may be obtained from the magazine ready for use at the following prices:

SINGLE PAGE

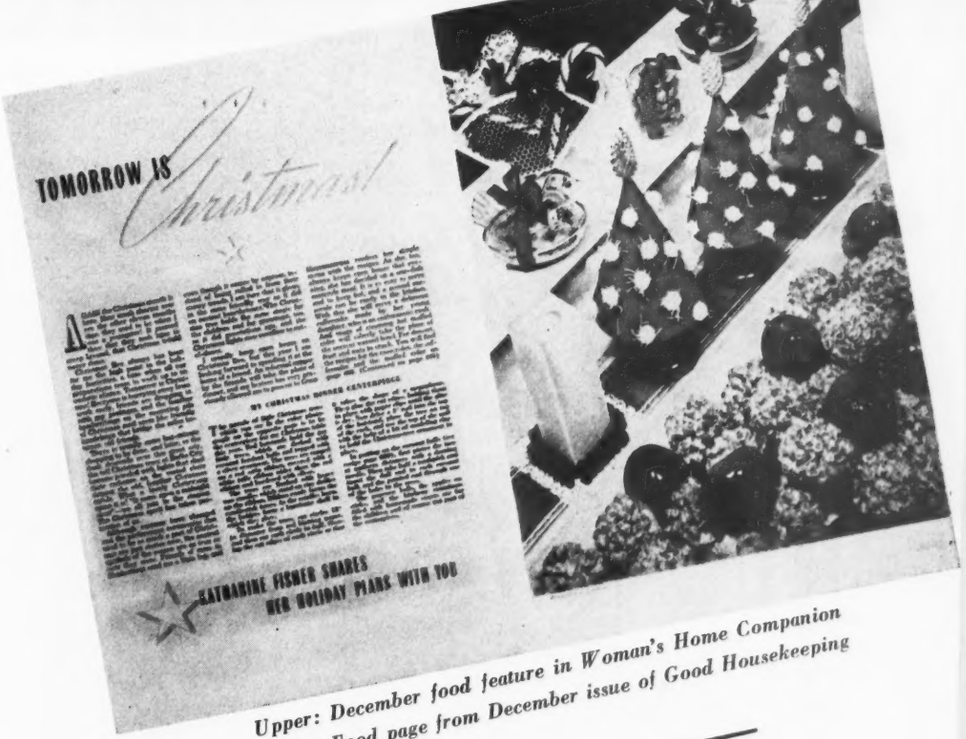
1,000 to 1,999 inclusive.....15¢
2,000 to 2,999 inclusive.....12¢
3,000 and over.....10¢

TWO-PAGE SPREAD

1,000 to 1,999 inclusive.....25¢
2,000 to 2,999 inclusive.....18¢
3,000 and over.....16¢

Manufacturers may either correspond with any one of the magazines direct, if interested in food pages appropriate for their products, or write to the distribution editor of Food Industries.

Each poster will carry the printed line "As seen in the December issue of ..... Magazine." The manufacturer's own selection of caption or "selling slug" such as "Try these recipes suggested by *McCall's*," "Sweets for the Holidays," "Make a Hit with your Holiday Party," "Christmas is Tomorrow," etc., will be printed at the top of the poster. No poster will bear the name of the manufacturer or his trade brand.



***Upper:** December food feature in Woman's Home Companion*
***Lower:** Food page from December issue of Good Housekeeping*

GOOD HOUSEKEEPING: Full color page which may be used to promote sale of apples, popcorn and ingredients for candy-making.

LADIES' HOME JOURNAL: Full color spread suitable for promotion of packaged, drawn or frozen poultry, canned or frozen peas, cauliflower, fruit and tea.

McCALL'S: Full color spread to promote sale of cooked or canned pumpkin, honey, cake ingredients.

PICTORIAL REVIEW-DELINEATOR: Two-color spread for promoting sale of candy-making ingredients including nuts, fruit, gelatine, syrup, sugar and flavoring.

WOMAN'S HOME COMPANION: Full color spread which may be used for promotion of cake ingredients, cranberry sauce, fresh or frozen carrots, green peppers, white turnips and parsley.

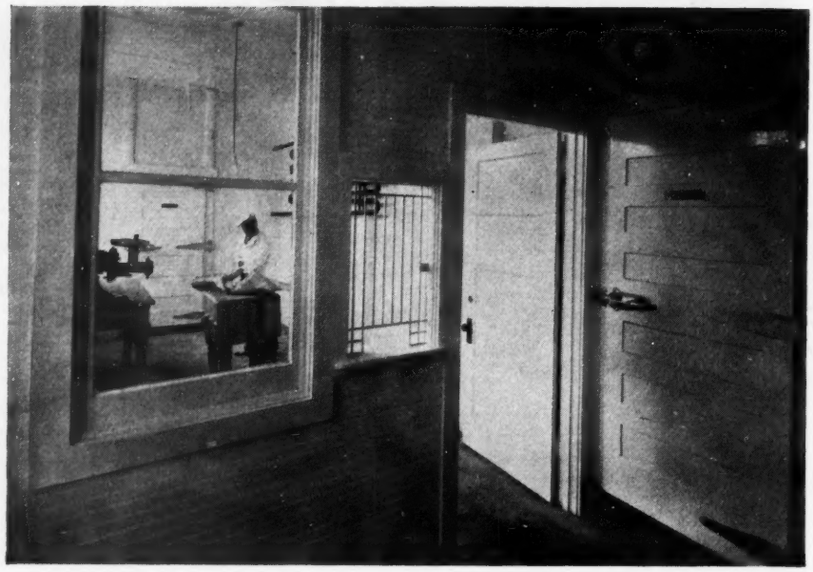
Locker Plants

(*Continued from page 637*)

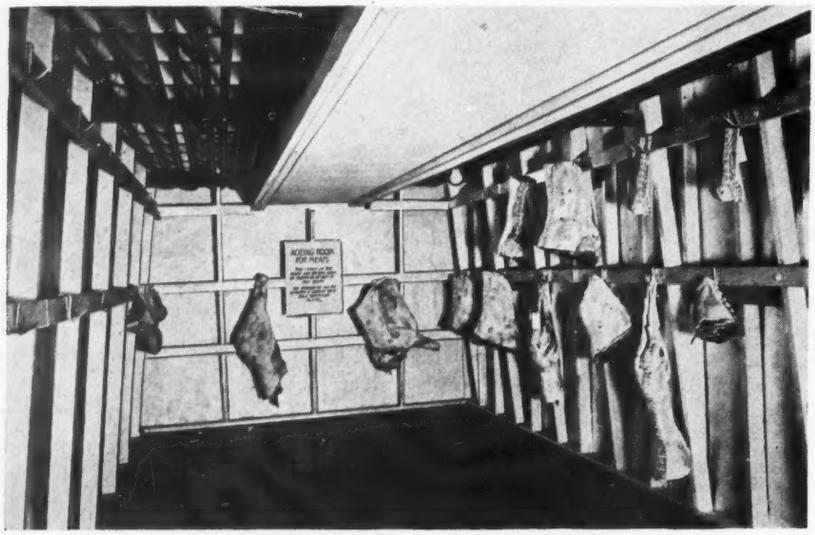
He found them interested—willing—enthusiastic—but, devoid of any farm produce to freeze for storage.

From farms outside the dust bowl he brought in beef, pork and poultry—had it killed and dressed, and hung in the aging room. Prospects were no longer hesitant. Almost as rapidly as a supply of products could be obtained, the lockers were rented and filled with frozen foods, until more lockers had to be added. The following year most locker renters provided themselves with their own farm products for the following year's freezing, either by raising the food or by barter.

The full service locker plants make up a new industry. They are an industry, because they not only provide and sell service, but convert raw material into finished products—they manufacture. They differ from other manufacturers because they do not yet manufacture for the market at large, but only for the customers to whom they sell service. Often they do not even take possession of the products they manufacture, possession remaining with the customers to whom they sell service.



Although the locker plant is equipped with the most modern butcher's equipment, it does not sell at retail in competition to local retailers but only in quantities to locker tenants.



Meat aging room in a modern full service locker plant.

The services offered by the complete service locker plant vary but little. Locker space is provided where frozen foods can be stored and maintained frozen (usually at zero to 10 deg. F.). All foods entering lockers, whether otherwise processed by the locker plant or not, are first quick-frozen. Although the services of all locker plants are much the same, the manufacturing varies considerably.

All complete locker plants provide refrigerated rooms for removing body heat from incoming slaughtered animals, and refrigerated rooms in which the meat is aged. All have equipment for preparing the meat in consumer cuts and packaging. All plants quick-freeze every product entering locker storage. These functions are common to all full service locker plants, beyond these functions they differ.

Some of the modern locker plants provide space and equipment for locker renters to blanch vegetables and prepare and package them at the locker plant, others do not. Some plants buy wholesale quantities of berries, fruits and vegetables, blanch, sugar or otherwise prepare them, package and quick-freeze them. These frozen products are sold to renters at wholesale prices plus a brokerage and processing charge.

Some plants have complete facilities for slaughtering, processing and rendering livestock. These plants buy livestock on the hoof or dressed carlots and prepare, aged frozen consumer packaged cuts for patrons, either from the plant's own supply of livestock sides and quarters or from the locker renter's own raw material.

Although the locker plant is a community industry, only a few years old, already the locker plant chain has developed, as well as branch operation. Branch operation consists of a central freezing plant where products are brought from collecting branches (usually within 50 miles) for preparation and freezing, and returned to the branch plant in refrigerated trucks for locker storage.

Full service locker plants vary in size from those with 250 individual lockers to those with as many as 1,500. Locker capacity varies from an approximate capacity of 250 lb. to between 400 and 500 lb. Generally each family rents a single locker. However, in one plant, one farmer with a large family and farm help rents nine lockers and keeps them filled at a profit throughout the year.

In addition to family users the locker plants also have small commercial renters. Fraternities and sororities in university and college towns,

Table I—Schedule of Service Charges*

Lockers	— Rental —	$1.00 per month
Lower Drawer	" — 12.50 " " "	1.25 " "
Processing (Cooling — Cutting — Wrapping and Freezing)		.0125 to .015 per lb
Grinding Hamburger and Sausage		.02 per lb.
Rendering Lard		.03 " "
Curing — Hams and Bacon		.03 " "
Smoking — Hams and Bacon		.01 " "
Freezing Fruits and Vegetables (Containers not included).		.01 " "
Cooling Meat not intended for Locker		.01 " "
Minimum Charge — Cooling or Freezing		.25 " "
Brokerage Charge — Meat Sales		.02 " "
Key Deposit (Deposit refunded on release of Locker)		.50 " "

Poultry	Chickens	Ducks	Turkeys	Geese
Dressing	4¢ ea.	10¢ ea.	10¢ ea.	12¢ ea.
Drawing	4¢	4¢	5¢	5¢
Chilling and Freezing	2¢	3¢	5¢	5¢

Slaughtering	
Hogs	$1.00 to $1.50 per head
Calves	$.75 to $1.00 per head
Beef	$1.50 to $2.00 per head
Sheep	$.75 to $1.00 per head

*"Locker Storage Plant Data", compiled by Armstrong Cork Products Co., Building Materials Division, Lancaster, Pa.

Table II—Comparative Locker Plant and Retail Cost of Meat*

Kind of Meat	*Dressed Weight*	*Farm Value*	*Service Costs*	*Total Cost*	*Retail Value*	*Annual Savings*
Beef...	375 lbs.	$49.49	$6.37	$55.86	$86.25	$30.39
Pork...	551 lbs.	60.00	18.55*	78.55	137.75	59.20
Veal...	100 lbs.	13.20	1.50	14.70	25.00	10.30
Total	1026 lbs.	$122.69	$26.42	$149.11	$249.00	$99.89

Average Savings	9.7¢ per pound
Average Service Cost:	
Beef	1.7¢ per pound
Pork'	3.4¢ per pound
Veal	1.5¢ per pound

'Includes cost of curing hams and bacon, and rendering lard.
*"Locker Storage Plant Data" compiled by Armstrong Cork Products Co., Building Materials Division, Lancaster, Pa.

Table shows the actual savings on meat made by one farm patron during his first year of using the locker plant service, based on the amount of meat his family consumed and the difference between what it actually cost him and what the cost would have been had the same meat been purchased at retail prices.

Distribution of Locker Plants by Size of Towns*

Population of towns	*Number of Plants*	*Per cent of Total*
25,000–100,000	5	4
5,000– 25,000	18	14
1,000– 5,000	70	53
Under 1,000	38	29

* Taken from a study of 131 locker plants by a locker plant equipment manufacturer.

where there are locker plants, rent one or more lockers in which to store frozen foods for use on the fraternity table. Small local retailers store in locker plants a supply of poultry and meats. Usually the animal on the hoof or fowl which provided this supply were purchased from a local farmer. Private clubs with dining rooms are steady customers of the locker plant in some localities.

The full service locker plant controls the processing of all meats, whether purchased by the plant or merely processed for renters, from the time the side or quarter enters the plant until the packaged frozen cuts enter the lockers of users.

Generally, aged meat when cut for freezing, is wrapped in moistureproof paper and again wrapped in wrapping paper. This outer layer is often in colors, each color designating the content, beef, pork, or mutton. The name of owners, weight of contents, and cut of meat are stamped on the outside of the package.

Not all plants control the processing of fruits and vegetables. They do, however, furnish booklets with instructions for preparing each fruit and vegetable. Some of these booklets are government prepared.

Blanching in boiling water or over boiling water in a steam bath, is recommended for vegetables, the time varying from 2 to 5 min. according to the vegetable. Either a dry pack or a liquid brine pack is suggested. A sugar pack is recommended for most fruits and berries and glazing of fish insisted upon before packaging the frozen product for the locker.

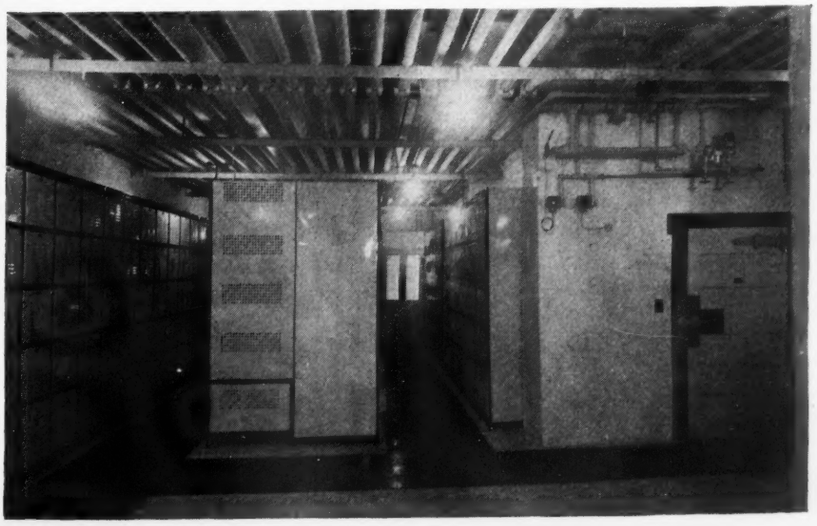
The locker plant system has expanded, locker plants generally have prospered in communities where they are located. Both the expansion and acceptance are not without reason. Locker renters, especially those who have the advantages of the modern plant, insist that the meat and poultry from their lockers is better than can be purchased at retail, and that the frozen fruits and vegetables surpass home-canned products.

There is another reason for the expansion and acceptance. The state extension service of the Department of Agriculture has aided and encouraged the industry's development, both through research and through educational services. Bulletins describing plant methods and providing instructions for preparing and cooking locker plant frozen foods have been widely circulated. Classes also have been held in 4H club camps for several years. The agricultural extension divisions of several state universities have distributed like educational services and the farm credit administration through bulletins has suggested the locker plant as a cooperative endeavor in rural districts. Already a considerable number of locker plants are cooperatively operated.

The locker plant system should be of interest to food manufacturers not only because there is a new food industry in their midst, but also because of its deep economic significance. The locker plant, according to its users, has not only affected economy in distribution but done so without sacrifice of quality. It is not without considerable satisfaction that locker plant users gloat over chucking the middleman out of the system. It is evident that there is a deep mistrust of the present distribution system, a situation worth the study of the food manufacturer.

There is another significant fact in the new industry's development. The locker plants are creating an acceptance for frozen foods more rapidly and possibly more soundly than are the commercial freezers of frozen food. Especially is this true for frozen meats.

The storage room of the full service locker plant is clean, sanitary and inviting.



New PACKAGES AND PRODUCTS

New Product From Arizona Groves

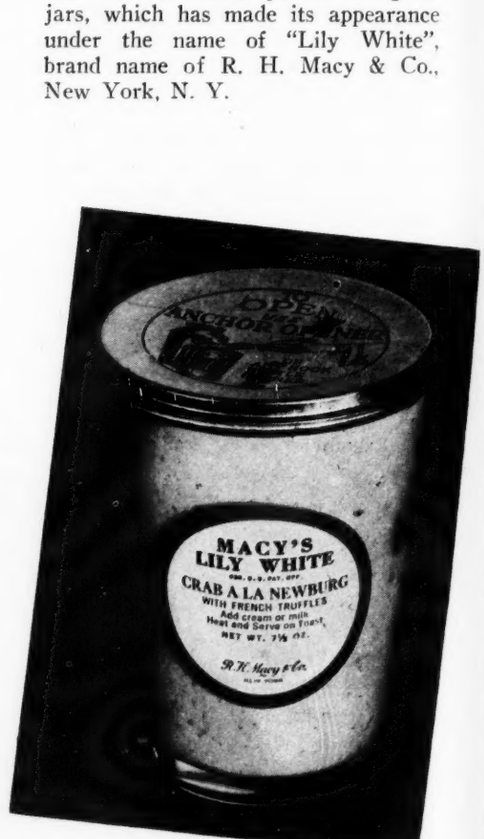
FROM THE CITRUS GROVES of Arizona comes a new beverage called "Ariz-Sweet" grapefruit juice packed by the Ariz-Sweet Packing Corp., Phoenix, Ariz. This product in gayly lithographed 1 pt. 2 oz. cans is manufactured in three varieties: unsweetened or sweetened with sugar or dextrose. The label suggests that Ariz-Sweet is a source of Vitamin C.

New Addition to Family Packaged Products

THE HILLS BROTHERS Co., New York City has recently introduced a ready-baked, old English fruit cake for retail distribution. This new Dromedary product is packed in 1 lb. key-opened, vacuum-sealed tins. The fruit cake container is one of a family of packages which employs the top of the can as space for label, illustration of product or advertising message. Held in place by the opener key soldered to the top is a lithographed illustration of the fruit cake contents of the can.

From Ingredients to Menus

FOR YEARS canners preserved such primary foods as corn, peas and beans, to serve as the ingredients for a dish or a meal. New products on the market indicate a trend toward the preparation of more ready-to-serve dishes, several of which make a meal and which will lessen drudgery for the housewife. (FOOD INDUSTRIES, April 1938, p. 207, June 1938, p. 341, July 1938, p. 393.) One of the most recent prepared products ready for consumption is crab a là Newburg with French truffles packed in 7½ oz. jars, which has made its appearance under the name of "Lily White", brand name of R. H. Macy & Co., New York, N. Y.



Merchandising
HINTS AND HURDLES

Blow to Cost Plus 6 Per Cent

SATISFYING EVERYBODY CONCERNED with fair trade laws has kept many manufacturers figuring well into the night, not excluding food manufacturers. Now out of a nebulous tangle comes something tangible. In the decision, Oct. 7, the Nebraska Supreme Court voided the key section of the unfair trade practices act passed by the 1937 legislature. The court in an opinion by Justice George A. Eberly, said the constitutional bill of rights gives everyone "the right of acquiring the absolute and unqualified title to every species of property recognized by the law," and that "includes the right to dispose of such property in such innocent manner as he (the owner) pleases, and to sell it at such a price as he can obtain in fair barter."

The court observed further that the act was so indefinite and uncertain that its Section 3 had to be declared void. There were no dissents. No mention was made of other sections of the act but since Section 3 is the heart of the measure, there was no question but that the ruling left the remnant of the law inoperative and virtually dead. The decision was made on the appeal of Jacob Ruback, former Omaha grocer, who was found guilty in district court of violating the act by selling coffee below cost as defined in the act, and was enjoined from further violation. The high court ruling reversed and dismissed the case. The act provided that it was unlawful to sell goods at retail below cost in Nebraska except under certain conditions such as moving damaged goods or to meet competition in good faith. It defined cost roughly as the invoiced price plus 6 per cent mark-up to cover overhead.

The court did not pass on the constitutionality of the measure in declaring Section 3 void on the ground that it was indefinite and uncertain.

Super-Markets Analyzed

EIGHTY PER CENT of the super-market customers spend more than $2 per week, 56 per cent spend more than $5 per week and 23½ per cent spend more than $10 per average week, according to a study of super-markets made by *True Story Magazine*, during the month of September, 1938. Almost 50 per cent of these super-market customers come to a super-market once a week; 14 per cent two or three times a week; 24 per cent come only every second or third week.

Super-market customers interviewed in their homes reported that they like the economy of the super-market as compared to the chain and independent in the ratio of 82 per cent for super-markets, 14.2 per cent for chain stores and 5.6 per cent for independents. Fully 52.7 per cent of the super-market customers liked the convenient shopping in the store itself, while 61 per cent liked neighborhood convenience of the chain store, and 38.9 per cent liked the good service of the independent. Only 1 per cent preferred orders taken over the phone.

Chain stores ranked first in quality; 41.2 per cent of the super-market customers liked the quality of the chain stores; 30.2 per cent liked the quality of the independent, and only 24.1 per cent liked the quality of the super-market. These are the results of a study of New Jersey super-markets.

School for the Grocery Clerk

THE SMITH-HUGHES and related acts of Congress provided federal aid for the vocational training of important groups of producers and consumers. Through the passage of the George-Deen act (effective July, 1937), Federal funds were made available for the training of all of the major occupational groups in the economic cycle from production to consumption including the field of distribution. The latter act provides a means of obtaining training for at least a portion of the 8½ million persons engaged in distribution.

Approximately 300,000 workers between the ages of 18 and 24 enter the field of distribution each year. Many become clerks who sell products of the grocery manufacturer. Practically no training for this vocation is given in the secondary school curriculum. Relatively few chain stores and other selling organizations provide any sort of training for their employees.

A bulletin of the Department of the Interior states, "Probably in not more than 25 cities have classes for distributive workers been organized by state and local educational authorities. It is apparent, therefore, that up to the present time, vocational training for those entering distributive occupations or extension training for those already engaged in such occupations have been almost negligible." According to the bulletin, "A census of distribution shows that distribution costs now take approximately one-half of what the consumer paid for his goods . . . although enormous gains have been made in recent years in reducing the costs of production, very little improvement along this line has been made in the field of distribution. More efficient distribution through better trained managers and workers will contribute to the future welfare of farmers and manufacturers as well as to that of distributive workers and consumers."

This bulletin, Miscellaneous Publication No. 2046, entitled "Organization and Administration, Distributive Education," describes the George-Deen act and the provisions for the disbursement of the $1,200,000 Federal Aid per year supplied by the act, the means of obtaining this aid, and the method of application for distributive education. There can be no doubt of the need of training for those engaged in food distribution, not omitting the grocery clerk. Many food manufacturers might wish the grocery clerk better trained in how to substitute—others in how to sell.

New Association Conceived

THE IDEA has been suggested and plans have been laid to form a new association to be titled "Frosted Food Institute." It is planned to include in membership packers, manufacturers, distributors and equipment companies. The need may exist for an association, even though packers in the northwest have their own frozen food association. But is it not expecting too much to try to bring together packers, manufacturers, distributors and equipment companies in one organization?

Truck Body Provides Different Temperatures for Foods

Has unrefrigerated compartment for smoked meats and a refrigerated section for other meats and cheese. Water ice used in new type heat exchanger.

DESIGNED for keeping different kinds of meat at different temperatures during distribution, the patented Weiland body is divided into two separate parts. One part, for smoked meat, is not refrigerated. The other part, for fresh meat and certain prepared meats and cheese, is refrigerated by a water ice system having no moving parts.

Two separate compartments are used because meats such as pork cuts, sausages, frankfurters and dried bolognas should be kept at a constant temperature varying between 36 and 45 deg. F. Cheese also should be kept in this temperature range. But smoked meats have a tendency to lose their bloom or discolor at temperatures below 60 deg. The Weiland body described herewith enables the two types of meat to be carried at the temperatures stated.

The body is the culmination of ten years of planning, experimenting and actual service by the Weiland Packing Co., Phoenixville, Pa., and its vice-president, J. A. Weiland, together with the company's body builders, the Boyertown Auto Body Works, Inc., Boyertown, Pa. While Mr. Weiland holds U.S. Patent No. 1,948,954 on the combined body and refrigerating system, he has licensed the Boyertown Auto Body Works, Inc., to build bodies for other concerns.

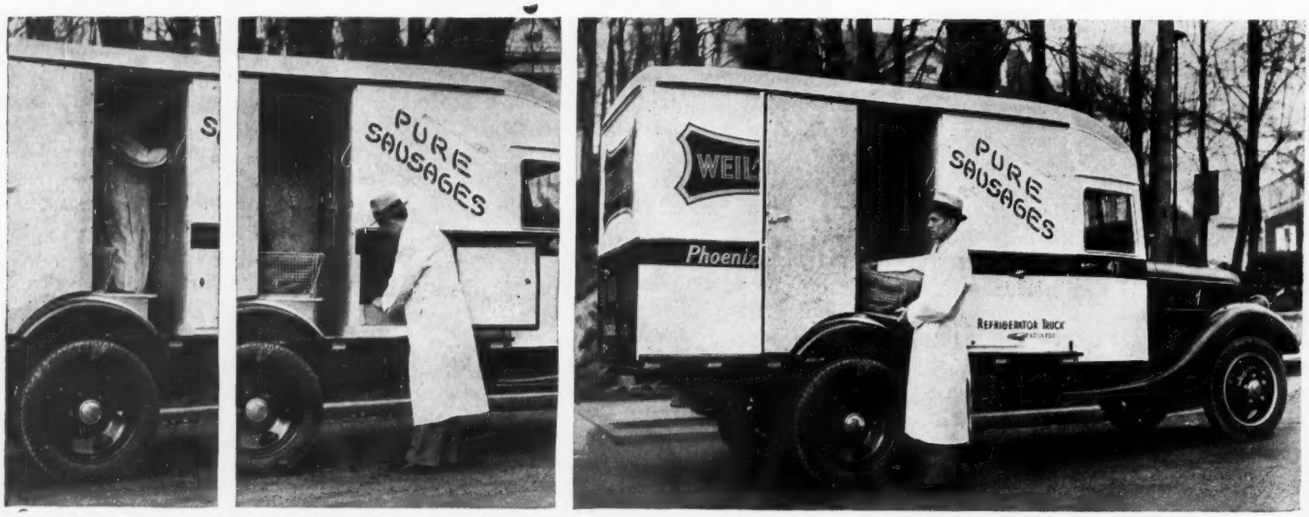
The latter company manufactures a standardized 9-ft. body of the Weiland type suitable for Ford or Chevrolet chassis of 131-in. wheelbase, with dual rear tires. In the Weiland service, these units, with oversize tires, helper springs and a low gear ratio, carry a net pay load of 6,000 lb. While the Weiland body illustrated has the cab integral with the body for better weight distribution, the Boyertown units can be supplied for use with separate truck cabs and also for heavier truck chassis.

While the Weiland body has many features of design to lessen the driver's work, as determined from experience with it, its main feature is the water ice hopper and the method of refrigeration.

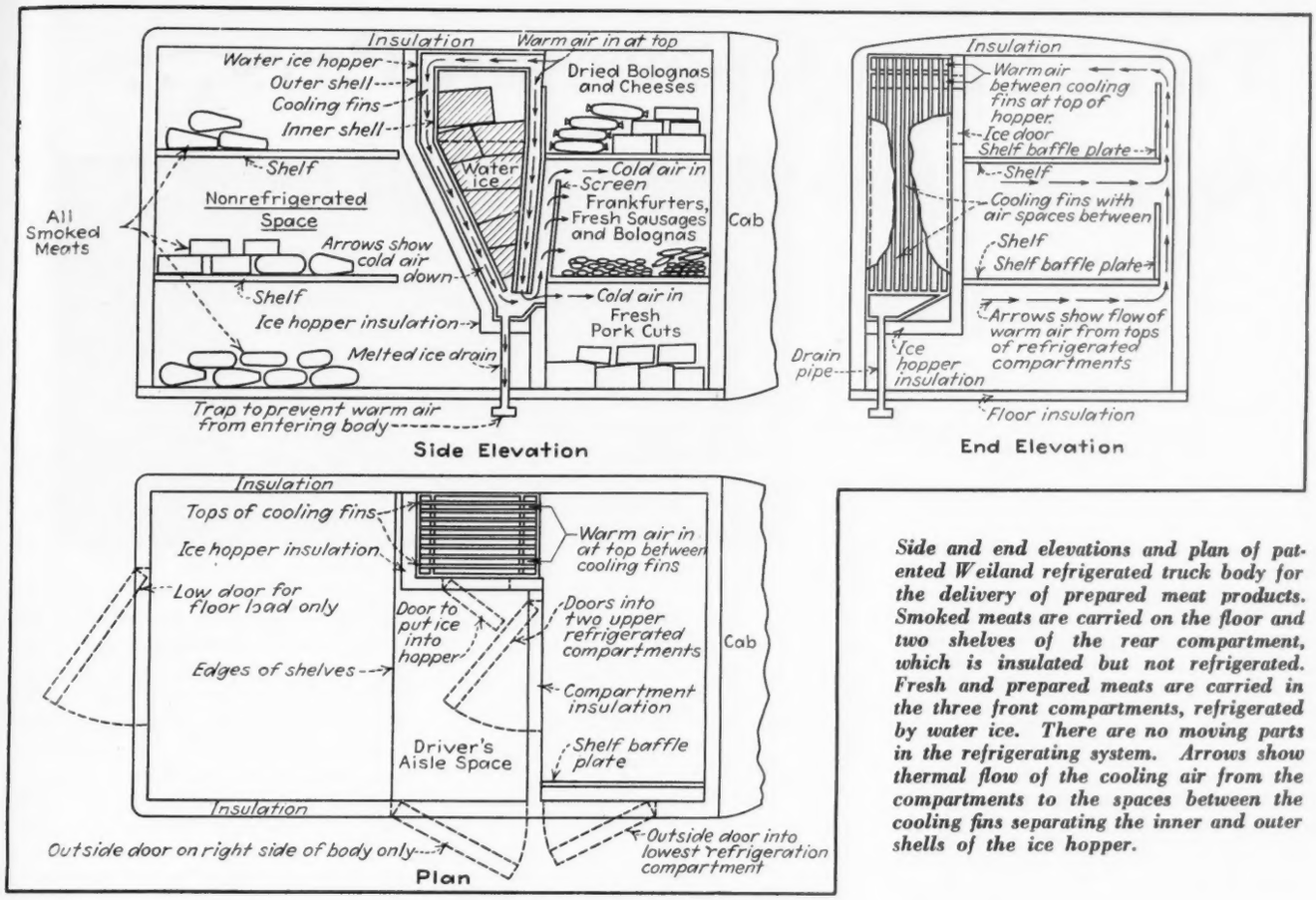
The body is divided into three transverse sections. These are a front refrigerated section, a center driver's aisle and a rear, open, nonrefrigerated section with two horizontal shelves. With a body 9 ft. long, the length of the refrigerated section, measured longitudinally, is 3 ft.; aisle, 2 ft.; and nonrefrigerated section, 4 ft.

The entire body is insulated to insure the maintenance of the proper body temperatures. The walls of the refrigerated section and the body roof are insulated with 3 in. of Dry Zero sealpads. The walls of the nonrefrigerated section are insulated with 2½ in. of Dry Zero sealpads. The floor of the body is insulated with 2 in. of cork.

The refrigerating unit and water ice hopper are located in the front left-hand corner of the driver's aisle, with



Three action views of the patented refrigerated truck body used by Weiland Packing Co., Phoenixville, Pa., and built by the Boyertown Auto Body Works, Boyertown, Pa. The body is divided into two parts by the driver's aisle. The rear part, for carrying smoked meats, is insulated, but not refrigerated. The front part, divided into three compartments by shelves for carrying fresh meats, is refrigerated by water ice. Driver inside body (left) removing fresh meats from top refrigerated compartment. Center, driver removing fresh pork cuts from the lowest refrigerated compartment through a door on the outside, curb side of the body. Right, driver about to carry filled wire basket to customer.



Side and end elevations and plan of patented Weiland refrigerated truck body for the delivery of prepared meat products. Smoked meats are carried on the floor and two shelves of the rear compartment, which is insulated but not refrigerated. Fresh and prepared meats are carried in the three front compartments, refrigerated by water ice. There are no moving parts in the refrigerating system. Arrows show thermal flow of the cooling air from the compartments to the spaces between the cooling fins separating the inner and outer shells of the ice hopper.

the forward part of the unit built integrally into the refrigerated section. This location is made possible because there is no aisle door on the left side of the body.

The ice hopper, made of galvanized steel, is vertical and extends from the top of the body (inside) almost to the floor. The side walls of the ice hopper are flat and extend vertically from top to bottom. The upper portion of the hopper is cubical in shape, but the front and rear walls of the lower portion are inclined in the form of a wedge, with the apex at the bottom. The weight of the ice causes it to settle in the wedge as it melts, keeping it in contact with the metal.

Around the ice hopper proper is another steel shell, taking the same general shape as the hopper itself. And outside of this shell is the insulation. Between the inner and outer shells, and holding the front and rear walls equidistant apart, are a series of flat, extruded aluminum plates. These are parallel with the sides of the hopper and are spaced about 1 in. apart, transversely of the hopper. The inside edges of these plates are in direct contact with the inside shell of the ice hopper and thus serve as cooling fins for air passing from top to bottom of the hopper between the spaces formed by the sides of these aluminum plates.

A 50-lb. cake of ice is placed in the wedge-shaped ice hopper through a door in the cubical-shaped upper portion. This door opens into the driver's aisle. The front wall of the outer ice hopper shell is built into the rear walls of the three individual refrigerated compartments.

THERE is a direct opening in the outer hopper shell at its bottom to permit the air circulating between the fins to enter the top of the lowest compartment and the bottom of the middle compartment. For this purpose, the rear edge of the lower shelf does not extend to the outer hopper shell. A screen placed along the free edge of the shelf prevents goods on the lower shelf from sliding off. These two openings let the cooled air into the lower compartments.

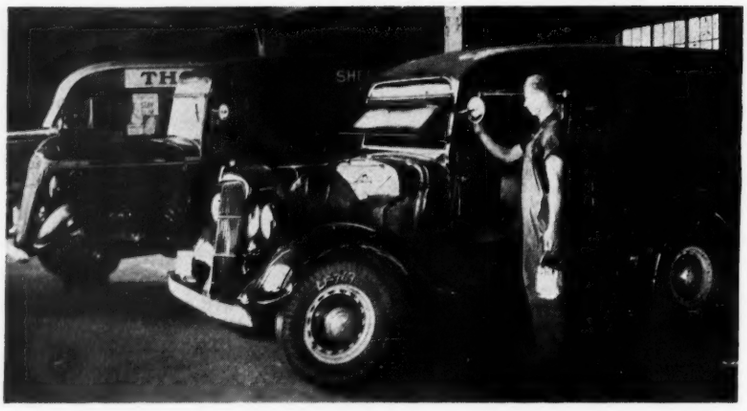
As warm air enters either of these compartments when the doors are opened, it rises to the top compartment by passing the edges of the two shelves which are terminated short of the interior body wall on the right side. Baffle plates are provided along the free edges of the shelves to prevent goods from slipping off.

When ice is put into the hopper, it melts down into the wedge section, cooling the air between the fin plates. Cold air is heavier than warm air so it flows down into the bottom compartment. As the air is heated and made lighter by absorbing heat from the goods carried or from warmer air entering during door openings, it rises to the top compartment through the channels described. It then enters the ice hopper through a direct opening at the top and follows the course shown by the arrows in the accompanying drawing.

Individual doors on the three refrigerated compartments help to conserve the cool air since the entire refrigerated section is not opened to the atmosphere each time any one door is opened. Tests made by the Weiland company show consumption of 560 lb. of ice with a total of 675 door openings for an average five-day summer week.

The unsold goods at the end of the daily route are kept in the truck overnight. This eliminates the cost of extra handling and any dissention among the salesmen as to disposing of unsold meats. Each driver must sell the following day what he failed to sell the previous day.

Paint Shop Operation Pays . . . *Sometimes*



Many factors must be considered

NUMEROUS FACTORS must be weighed in the minds of executives operating trucks in reaching a decision as to how repaint work can best be handled. These factors are discussed and solutions to the paint problem given in the paragraphs below.

How Painting is Done

IT SEEMS TO BE THE CONSENSUS of opinion that it is not profitable to operate your own paint shop when you have less than approximately 100 vehicles within a reasonable geographical area, so that all of these vehicles can be painted in the one shop. This opinion, of course, should be modified, depending upon the circumstances in each individual case. For example, if the company has suitable space available that otherwise would not be of much use, then, of course, it would be profitable for it to operate its own paint shop, even with fewer than 100 vehicles. On the other hand, if considerable reconstruction or new building work must be done to provide a paint shop, then we feel that 100 vehicles would be the minimum to justify the opening of a paint shop.

To get the maximum efficiency out of the finish on the vehicles, a company should establish a definite policy of touching up and revarnishing each vehicle every eight to ten months, and it should also adopt the policy of removing all of the paint down to the bare metal and completely repainting each vehicle every 30 to 36 months. This would mean that on 100 vehicles you would need to place in the paint shop between 100 and 125 vehicles per year. Only about 35 of these would be complete paint jobs, and about 100 or 125 would be revarnish jobs which would call only for retouching of damaged spots and applying a new coat of varnish. Revarnish jobs would need to be in the shop about two days, and the completely repainted jobs, about a week. This schedule, of course, would mean that, on the average, about three trucks per week would go through the paint shop.

One good finisher, together with a helper who might be employed on a part-time basis to assist in cleaning up the jobs, removing the old paint, and so forth, ought to be able to take care of the work.

Many have found that where a suitable man can be located who is willing to take a contract at so much per job for revarnishing work and a different figure for completely repainted jobs, it is better to have the work done on the company's own premises, with the company supplying the paint and paying the contractor so much per truck, than to hire a foreman finisher on an hourly or daily basis. This is for the reason that the cost per truck is then fixed and averaged out on difficult jobs as well as easy ones, and there is no possibility of overhead expense continuing through paying a salary or an hourly rate to the finisher if no trucks happen to be in the shop.

The price that would be a proper one to allow for each varnished or completely repainted job depends, of course, upon the local labor market as well as upon the number of coats applied, the size of the truck, whether the finishing materials are applied by spraying or by brushing, and so on. When compressed air is available, a much more economical job can be done, with satisfactory results, by spraying than by brushing, although many prefer to brush the finishing coat of varnish even if all of the other coats are applied by spraying.

Whether or not it is advisable to do your own body work in your own shop or to farm it out depends upon local conditions and upon the amount of such work to be done, as well as upon the availability of a man who is competent to do this kind of work. Some are fortunate in finding a contract man who is competent not only to take care of the painting operations, but also to do the body repair work. In this case, of course, it is better to do the repair work in the company's own shop. If it is necessary to hire two separate men for this work, we think that it might be better to farm out the repair work than to do it in the company's shop.

We estimate that one man, a good all around man with some knowledge of washing wood and metal, could handle a fleet of 50 trucks. It will take one man one week to do a complete job on a medium size truck, including burning off of old paint. Minor body repairs would be included. In the event that every one of your fleet would have to be stripped, then of course the one man will have his hands pretty full. But as the average fleet is operated, he might have only one truck a month to completely repaint, and on the other trucks perhaps he would just patch up a crack or so and do a revarnish job. Naturally, it will have to be an all around man to keep a fleet of this size in order. He would have to be able to take out dents in the metal as well as be familiar with a spray gun and be able to do lettering. In small fleets, usually an outside man is called in to do the lettering and maybe apply the "decals"; it would take one man a year to completely refinish a fleet of 50 trucks.

—GLENN M. DAVIDSON, *assistant general superintendent of food division, Durkee Famous Foods, Chicago, Ill.*

Food Technology

NEW DISCOVERIES AND INVENTIONS

PACKAGING

Food Tin Enamel

AN IMPROVED COMPOSITION for lacquering the inside surface of food tins has the double merit of protecting can contents thoroughly from contact with the metal, and of being unharmed by prolonged exposure to pasteurizing temperatures. As the invention is disclosed in British Patent 483,180 (granted May 12, 1938, to Chambon Corp., Garfield, New York), the lacquer is a thermoplastic composition which is inert to food substances. To make sure that an even, smooth film covers the inner can surface and that all surface irregularities in the metal are filled in, the lacquer is fused by a current of hot air after it has been applied to the metal. A smooth, even film is the result. Prolonged exposure to pasteurizing heats of 180 deg. F. or even higher does not harm the coating. The preferred procedure is to apply the coatings to the flat metal blank, before it is formed into a can. Lines for the soldering seams are left uncoated. The smoothing operation, with hot air, is carried out *after* the can has been formed.

FOOD ENGINEERING

Damaged Milk Bottles

MILK BOTTLES are thrown out at a dairy because of breakage or chipping caused by impact or heat, excessive etching due to bottles rubbing against each other (usually visible only after an average of 25 trips) and because of defects in manufacture. These last are commonly "stones" (particles of foreign matter in the glass) and "blisters" (air bubbles in the glass), both of which give the bottle a bad appearance.

Impact damage is commonest around the lips and bottom rims, while heat cracking occurs chiefly in the lip and neck, mainly during bottle washing. More gill bottles are rejected than any other size, followed by quarts, half pints and pints. When there is a low average of trips per bottle, rejections are low.

Digest from "A Plant Study of Damaged and Defective Milk Bottles," by C. T. Roland and H. A. Trebler, *Journal of Dairy Science*, 21, 275, 1938.

Filtering Beverages

MIXED FILTER AIDS are used to excellent advantage in a new method for filtering beverages, as disclosed in German Patent 659,874 (granted May 12, 1938, to Karl Braun, Stahnsdorf). A fine granular or fibrous material is used, for example, asbestos powder or fiber, but it is mixed with powdered or granular material (wood, flour, cork dust or sawdust or the like) in which the particles are coated with a dielectric substance. In one embodiment of the invention, a filter aid for beverages is composed of 75 per cent of asbestos powder and 25 per cent of coated cellulose fibers. The dielectric coating may be of rosin, pitch or any suitable wax, applied in known manner. Beverages with good sparkle and clarity are obtained by this method of filtration.

BAKERY PRODUCTS

Cake Baking

TO GIVE DOUGH the character (especially the flavor) of cake dough, the added sugar must be at least 1 part (by weight) to 20 parts of flour. Use of 1 part butter and 2 parts sugar in 20 parts flour gives a good cake dough. Dough fermentation uses up part of the sugar, even though cane sugar does not itself ferment, because part of the cane sugar undergoes the sucrose-to-fructose conversion, and fructose is fermentable. About 20 per cent of the starch is converted to soluble sugars during the dough fermentation, but no such conversion occurs during baking.

Comparative determinations of sodium chloride before and after baking showed an average apparent increase of 2.7 per cent, thus indicating 2.7 per cent loss of substance. The actual loss is larger since this method does not make any allowance for the initial fermentation.

The baking process has no significant influence on the content of butyric acid or the total content of lower fatty acids. Since the iso-oleic acid content did not increase during baking there was evidently no elaidinization of the fat. True cake dough cannot be made solely by adding sugar to a dough. Some fat is also essential. This rule is generally applicable to cakes with low and moderate sugar content, but ceases to be true in products with very high sugar content, such as honey cakes.

Digest from "Behavior of Sugar and Butter in Cake Making," by J. Grossfeld and H. Damm, *Zeitschrift für Untersuchung der Lebensmittel*, 75, 137, 1938 (Published in Germany).

BEVERAGES

Low-Sugar Beers

ASIDE FROM personal taste preferences, there is a reason for producing beer with very low sugar content, namely the need of persons suffering from diabetes. Their beverages must contain little or no sugar. The long-standing belief among physicians that diabetics must be limited to genuine Pilsener, however well founded it may have once been, is now erroneous because there are other low-sugar beers.

The latest development in this direction is controlled diastatic fermentation. In the usual brewing practice, a certain amount of dextrin, capable of yielding fermentable sugar, is intentionally left in the beer to impart viscosity and body. In the new procedure for making low-sugar beer, the fermentation is carried to a point never attained in even the most highly fermented beers of previous brewery practice. Such a high degree of fer-

(*Turn to page 662*)

The PLANT NOTEBOOK

Making Safety Work Interesting

Reduction in the number of traffic accidents reported during the last year by salesmen drivers for the Allentown and Easton, Pa., divisions of the General Baking Co. is attributed to a change in methods of handling safety problems. The methods which were used can be applied with slight modification to any safety work.

Approximately 90 trucks are in continuous service in the combined fleets at both plants. A number of effective methods to reduce accidents have been developed by the safety committee, of which Alvin Gehman is chairman.

Gehman has been a route salesman for the past ten years and has had enough experience to know the hazardous conditions his fellow salesmen face every day. Because of his study and experience he is able to counsel the other men on traffic problems.

While all drivers are required to attend the safety meetings held at the plant once a month, Gehman has found it is also necessary to maintain contacts in reference to safety work with the drivers between these meeting periods.

"Cooperation is the secret of effective safety work," he explained, "and to obtain this cooperation it is necessary to talk with the men individually instead of depending entirely upon group contacts. We use the human approach, help the individual to solve his problems and show him how to use sound judgment to get the right perspective. When a man can do this he will have a real desire to cooperate and will establish a good safety record."

Accidents reported during the month are brought up for review at the monthly meeting. Five members of the safety committee sit as a jury to determine responsibility for accidents, and in reviewing a case the verdict will place responsibility in one of four separate classifications:

1. Where the employee has been found responsible;
2. Where the employee has been partly responsible;
3. Where the employee cannot be held responsible but might have avoided the accident;
4. Where the employee could not avoid the accident.

At a recent meeting each driver received a questionnaire listing ten questions and space for the answers. The questions were written by Gehman and in handing them to the men it was explained that the answere were to be according to sound driving sense and not according to the motor code or legal decisions.

The questionnaire was received with much interest. Each man wrote his answers and afterward had the questionnaire returned with a set of correct answers and the driver's rating marked on his sheet.

Alvin Gehman, who heads the safety committee whose work is described in this article.

Gehman believes that things like this make safety work interesting and cause the men to pay more attention to the efforts of the safety committee.

"The more new ideas we can develop," he explained, "and the better we can perfect our methods of approach to the safety problem, the greater will be the interest of the men."

At every meeting the men are asked to suggest new methods or new ideas to reduce accidents. The men are encouraged to think of safety problems and in this manner advance the work of the firm's safety program.

Proper attention to all the details of a well-planned safety program brings with it the burden of much additional work for the members of the safety committee. In selecting men for such committees it is essential that only those be chosen who are willing to assume this additional work.

Drivers are advised to immediately report accidents to a member of the committee, whether it has been reported to the traffic department or not. They are also cautioned to tell the truth about each accident. It is pointed out that investigation will eventually prove whether a truthful report was made, and if an inaccurate report was made it will count against the driver's record.

When a truck is brought in from a route and it needs service the driver is required to write a garage order listing the service needed and hand it to the service man in the garage. Before taking the truck out again the driver is asked to check over it personally and if it is not in serviceable condition he should refuse to take it out.

Ordinarily the service department functions smoothly but there may be occasions when something is neglected. For instance, one morning a driver came for his truck and found that the service man had shifted the truck during the night and had failed to turn off the ignition. The battery was dead, so they pushed the truck on the street to start it. By keeping the engine running during the morning the battery was sufficiently charged to be of some use.

The following day the driver asked Gehman this question: "If the truck engine had stalled as a result of the weak battery and had been in an accident, who would have been responsible?"

Gehman replied that undoubtedly the driver of the truck would have been held responsible because other trucks were available and one of those should have been used.

Another driver reported that he had asked for the change of one tire and that the service man hadn't made the change. This happened while the service manager was away on vacation. Gehman inspected the tire, had the change made at once, and at the same time explained to the service man what might happen if such a tire should break while going down a hard grade.

This firm does not follow the policy of discharging men because of accident records. Instead an effort is made to correct habits which are likely to cause accidents. It is pointed out that it would hardly improve the accident record by taking on an inexperienced man every time an experienced driver has an accident.—R. H. Butz, *Allentown, Pa.*

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

New Work Light

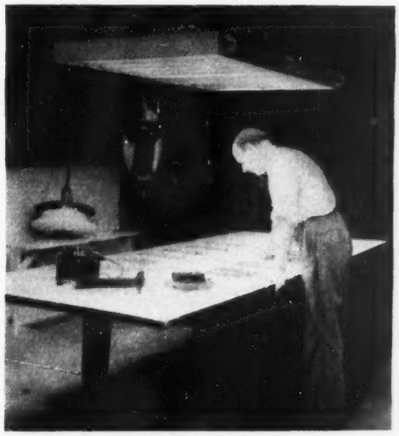
FLUORESCENT ELECTRC LAMPS, made by General Electric Co., Nela Park, Cleveland, Ohio, are now available through dealers in most parts of the country. These lamps not only provide an entirely new lighting medium, but also make possible light applications not previously easily available to the food industries.

Fluorescent Mazda lamps are in the form of glass tubes, 1 in. or 1½ in. in diameter, and 18 in., 24 in., or 36 in. long. These tubes fit into ring sockets at each end. The interior surfaces of the tubes are coated with a substance that becomes fluorescent under ultra-violet light. The necessary ultra-violet light is created by a mercury vapor arc within the tube. The coating on the tube not only produces the light by fluorescence, it also diffuses this light and shields the arc, so that glare is reduced.

Fluorescent coating powders are available to produce a number of colors, white light and also a highly satisfactory form of daylight lighting. This is possible because various powders transform the ultra-violet radiation into various wave lengths of visible light.

As Fluorescent Mazdas operate by means of an arc, auxiliary equipment is necessary. The auxiliaries have been designed so that each lamp has its separate unit placed adjacent to the lamp or in the same fixture. These auxiliary units are compact.

Advantages of the new lamps include the production of more light for a given consumption of electric power (or the same light for less wattage). While the colored lamps require much more power for a given illumination than do the white and daylight lamps, both classes make possible a wide advantage over the corresponding incandescent lamps. The illumination from an 18 in., 15 watt Fluorescent Mazda of the white or daylight types is about 30 lumens per watt. In general, these lamps give about five times as much illumination per watt as do incandescent lamps.



Battery of Fluorescent Mazda daylight lamps in place above an inspection table

Another advantage is that the new lamps produce much less heat for a given amount of illumination, which naturally follows on the lower consumption of electricity. In addition, the light source is more diffuse than in an incandescent lamp, so that what heat and glare are produced are less concentrated.

One particular advantage in the new lamps for the food industries lies in their use as an inexpensive source of daylight illumination. As shown in the illustration, a battery of these lamps can be placed directly over an inspection table or belt. This will provide ample daylight illumination for inspection or sorting, as needed in fruit and vegetable packing and similar operations, without producing sufficient heat to inconvenience the worker or damage the product.

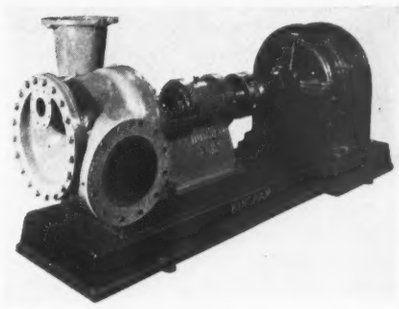
Truck Tire

B. F. GOODRICH Co., Akron, Ohio, is manufacturing a new first-line truck tire in its Silvertown line. This tire uses the "Hi-Flex" cotton tire cord, designed to reduce tire heat generated in high speed service. A new tire building method is used. So-called artificial stretch is removed before the cord is built into the tire, giving a more compact, smaller-gage product, which returns to its original position after being stretched. In this method, more rubber is used between the cords and slippage of fibers against each other is prevented, reducing friction and internal heat.

These new tires have less overall thickness without reduction in strength.

Food Plant Pump

BINGHAM PUMP Co., 703 East Main St., Portland, Ore., has developed a special hydraulic type pump, suitable for use in such food industries as fruit juice canning and milk processing, where entrained air and gases in fruit juice, or foam in whey and milk, cause trouble. This pump separates all air and gases from the liquid, and releases them through an exhaust vent. It delivers the liquid through the pump discharge at a steady, even rate of flow.



Food industries pump separates foam, air or gas from liquid.

Another feature of these pumps is that they are so designed as to prevent any accumulation of foam or gas in the volute or impeller eye. This avoids trouble from air binding and reduction of pump capacity. Use of these pumps is said to permit savings in horsepower requirements and to increase efficiency by eliminating the necessity of special equipment for handling foaming liquids.

These pumps have only one moving part, a rotating element. Materials of which the pump is constructed are varied to suit the service required, so as to provide protection against corrosion and abrasion.

Interval Timer

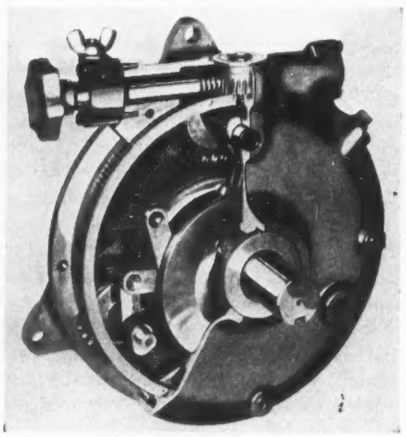
R. W. CRAMER & Co., INC., 67 Irving Place, New York, N. Y., are marketing an interval timer. This is designed for installation as an integral part of equipment operating on a predeterminable time basis. Operation is by slow-speed synchronous motor, assuring accurate timing. Thirteen timing scales are available, from a one-minute dial with divisions in seconds to an eight-hour dial with fifteen-minute divisions. Delayed start button and automatic stop are optional features. Three types of contacts are also available: normally open; normally closed; and double throw.

Variable Speed Control Unit

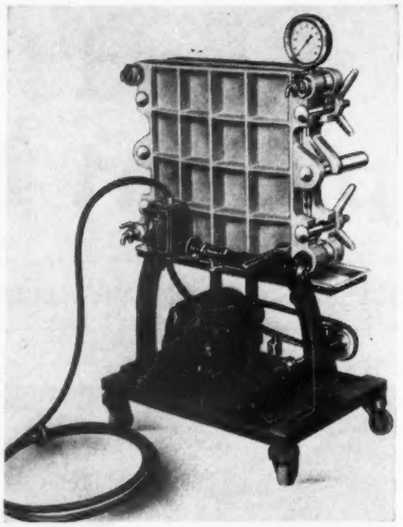
MORSE CHAIN Co., Ithaca, N. Y., has developed a variable speed control unit. This has been successfully tried out in the grain milling industry and is now being applied to processing equipment in other fields.

The unit has an eccentric cam integral with the input shaft. Resting on this cam are a series of rollers that connect in pairs through link motions to indexing clutches. The links are also interconnected to the adjustable center ring member which serves to control the indexing movement of the clutches. Thus the segmental angular motion of the clutch arm causes a driving effort upon the output shaft through engagement of the clutch pinion and the shaft gear. Adjustment of the center ring by means of a worm screw changes the segmental angle and alters the length of the stroke affecting the output shaft speed.

The unit is compact and easily adjustable whether idle or running. The low speed shaft can be varied from 1½ to 40 r.p.m. at 180 r.p.m. input. It has 3 hp. capacity rating, with 200 ft.-lb. torque load for the maximum rating.



Variable speed control unit.



Seitz Junior single disk filter.

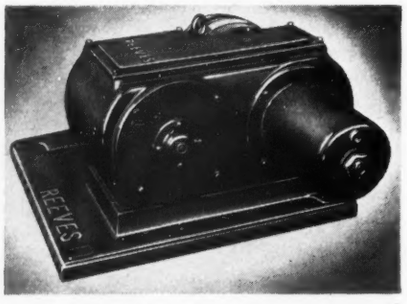
Single Disk Filter

AMERICAN SEITZ FILTER CORP., 480 Lexington Ave., New York, N. Y., is making a Single Disk Junior Filter, No. 40-1. This filter is of simplified design which can be readily expanded from single disk to multi-disk by adding filter screens. It takes a 16x16 in. sheet, has a 256 sq.in. filtering area and delivers up to 100 gal. per minute.

A feature is a by-pass plate providing double filtration in this small single unit. By means of it, the filter sheet is divided into two sections, permitting the filtrate from one section to flow into the second section. In this way, both rough and polish filtrations can be accomplished at the same time.

Variable Speed Control

REEVES PULLEY Co., Columbus, Ind., has developed an automatic, remote control for use with the Reeves "Vari-Speed Motodrive," which is a unit



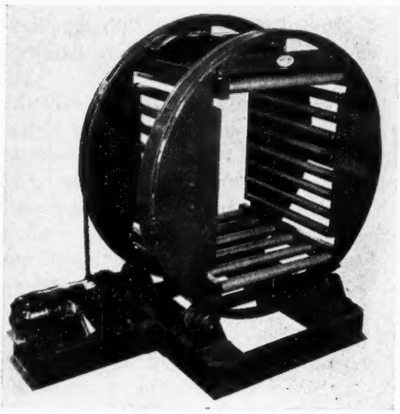
Variable speed control.

combining a driving motor, a variable speed mechanism and reduction gears. This control, known as a fluid pressure control, automatically regulates speed from pressure variations. It can also be used as a manual remote control or as a semi-automatic manual control.

The device consists of a bellows shifting mechanism mounted on the "Motodrive," as shown in the illustration; an adjustable pressure reducing valve located where desired; auxiliary valves, if needed; and connecting pipelines. Fluid pressure is transmitted by means of oil, water, steam, gas or air by a valve through piping to the bellows shifting apparatus which operates to increase or decrease the speed.

Power Operated Roll-Over

FOR INSERTION in conveyor lines, Mathews Conveyor Co., Ellwood City, Pa., has devised a power operated roll-over. The purpose of this is to turn cartons 180 deg. so as to rest on their tops before entering a bottom-type carton sealing machine.



Power operated roll-over for cartons.

In use, the smaller size cartons must first have the flap closed and secured with tape before entering the roll-over. As the cartons enter, the operator starts the machine by means of a switch. The carton then slides up against the rolls on the side of the unit and is conveyed on its side as the unit is revolving until it comes to rest on the tread opposite that on which it entered. The unit then automatically stops. Another carton is inserted, pushing off the one that has been turned.

Oil Proof Tire

FOR USE IN PACKING PLANTS, oil mills and other places where vegetable or animal oils may get on the rubber tires of factory trucks, B. F. Goodrich Co., Akron, Ohio, has developed its "Universal Oil-Pruf" industrial tire formula. The "Oil-Pruf" tires made from this compound are said to have shown an improvement of 30 per cent in wear in meat packing plants, as the rubber is not as greatly affected by contact with grease and hence the tread does not cut, chip or wear so much.

Just Off The Press

BOOKLETS • LITERATURE • BULLETINS

Food Plant Equipment

BAKERY EQUIPMENT—A reference book of bakery equipment, with illustrations and specifications, has been published by Read Machinery Co., Inc., York, Pa., in the form of a 32-page bulletin.

BAKERY EQUIPMENT — Slicing, wrapping and sealing equipment for bakeries, made by Oliver Machinery Co., Grand Rapids, Mich., is the subject of a 16-page illustrated bulletin.

DEHUMIDIFICATION EQUIPMENT—The Research Corp., 405 Lexington Ave., New York, N. Y., has published a 15-page illustrated catalog on their system of air conditioning and chemical dehumidification.

DEHYDRATOR—Silica gel dehydrators, providing direct control of humidity independently of temperatures, are described in a bulletin entitled "Carrier Silica Gel Dehydrator" by Carrier Corp., Syracuse, N. Y.

DISINTEGRATING EQUIPMENT—The "Bethune Promulsor," a machine for carrying out processes involving disintegration, dispersion or emulsification of liquids, or solids in liquids, is described in an 8-page illustrated bulletin by Promulsor Corp., 1270 Sixth Ave., New York, N. Y.

FUMIGATION—Standard practice for fumigations with hydrocyanic acid gas generated by "Cyanegg" is given in a 44-page bulletin issued by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

MIXING EQUIPMENT — "Gardner" mixers, and sifters and mixers, also "Unique" mixers, for all kinds of powders, semi-solids and liquids, are described with specifications in an illustrated catalog, No. 32-E, issued by Robinson Mfg. Co., Muncy, Pa.

TOMATO EQUIPMENT—The "Rietz Cold-Break Process" for packers of tomato juice, tomato puree and catsup, is described in a 4-page illustrated bulletin of Chisholm-Ryder Co., Inc., Niagara Falls, N. Y., which also describes the Rietz disintegrator.

WATER PURIFICATION—"Ozone" is the title of a booklet issued by Norwood Filtration Co., Florence, Mass., describing and illustrating the use of ozone in the purification of water.

Plant Accessories and Supplies

AIR ELIMINATOR — Specifications, prices, construction and installation of high pressure automatic eliminators for air venting of steam heated equipment form the subject of Bulletin No. 106, published by Gorton Heating Corp., Cranford, N. J.

BLOWERS—Bulletin 21-B-19 contains descriptions and specifications of Victor-Acme rotary positive blowers and oil pump units, built for volumes of 5 to 700 cu.ft. of air per minute and pressures of 8 oz. to 7 or 8 lb. per sq.in., by the Roots-Connersville Blower Corp., Connersville, Ind.

BOILER CONTROL—The Bailey Meter Co., Cleveland, Ohio, has published Bulletin 46, describing this company's boiler meter and its applications, and giving an engineering discussion of boiler control.

CENTRIFUGAL PUMPS — Ingersoll Rand Co., Phillipsburg, N. J., has published Bulletin No. 7067, giving specifications and operating characteristics of the Cameron two-stage centrifugal pump, Class GT, with 100 to 2,200 gal. per minute capacity and for heads up to 350 lb.

CLEANING EQUIPMENT—The Clayton Mfg. Co., Alhambra, Cal., describes the various uses of "Karrick Cleaner," an all-purpose power spray cleaning machine, in a 16-page illustrated booklet.

DUST REMOVAL EQUIPMENT — Claude B. Schneible Co., 3951 Lawrence Ave., Chicago, Ill., has published two bulletins dealing with multi-wash dust collectors and junior multi-wash dust collectors for removing dust and fumes from air.

GAS MASKS—Six features of Acme full vision industrial gas masks are described in folder M-372 by Acme Protection Equipment Co., 3616 Liberty Ave., Pittsburgh, Pa.

GEAR PRODUCTS—Philadelphia Gear Works, "G" St. and Erie Ave., Philadelphia, Penn., have published a 72-page illustrated catalog listing stock and standard gears.

MAGNETIC REVERSING SWITCHES—General Electric Co., Schenectady, N. Y., has issued Bulletin GEA-1565B dealing with A-C magnetic reversing switches for use with motors running in both forward and reverse directions.

MAGNETIC SEPARATORS — Magnetic separators of the pulley type are illustrated in Catalog No. 25 issued by Dings Magnetic Separator Co., Milwaukee, Wis.

MECHANICAL PACKING — Selection data for mechanical packings to suit every industrial service, are given in a manual and data book issued by Renear Packing & Rubber Co., Inc., Philadelphia, Pa.

MOTOR REDUCERS — Philadelphia Gear Works, "G" St. below Erie Ave., Philadelphia, Pa., has issued bulletin MR36, listing data on various types of the motor reducers for motor speed reduction in machine drives.

WATER CONTROL EQUIPMENT—"Numatic Water Control" is the title of Bulletin No. 29-D published by the Clayton Mfg. Co., Alhambra, Cal., giving specifications, illustrations, installation and operation of a control for pneumatic water tanks.

WELDING EQUIPMENT—Welder specification bulletin No. 327 dealing with Diesel driven "Shield-Arc SAE" welder Type S-6037, for use where electric power is not available, has been published by Lincoln Electric Co., Cleveland, Ohio.

Packaging

BAG CLOSERS—A 4-page illustrated folder describing an automatic bag closing machine for use in packaging coffee and similar foodstuffs, and having an output of 30 bags per minute, has been published by Bag Closing Corp., 29 South LaSalle St., Chicago, Ill.

PRINTING ON CELLULOSE—"Color Printing of Transparent Cellulose Bags and Envelopes" is described in a 12-page illustrated booklet containing samples, published by United States Envelope Co., 21 Cypress St., Springfield, Mass.

TRANSPARENT PACKAGING—A folder and memo blank published by the Packaging Division, Celluloid Corp., 10 E. 40th St., New York City, deals with "Lumarith," a transparent packaging material available from .00088 in. to any thickness required.

The Food Industry News

GENERAL NEWS, BUSINESS TRENDS, MEN, JOBS AND COMPANIES • NOVEMBER, 1938

Facts on Frozen Foods Heard at Conference

New information on what happens when foods are quick frozen by different methods and at different rates was revealed by J. G. Woodroof, Georgia Experiment Station, Experiment, Ga., at the Food Preservation Conference held at the University of Tennessee, Knoxville, Oct. 20–21. Briefly, Mr. Woodroof stated that freezing must take place at a rate of 0.3 cm. a minute to produce small crystals that will not rupture the cell walls. And he rated freezing by immersion as the most effective method. The full text of his talk is given in this issue of FOOD INDUSTRIES on page 618.

Speaking on "The Effects of Freezing on the Vitamin Content of Vegetables," Gerald A. Fitzgerald, Birds Eye Laboratories, traced quality deterioration, using vitamin C as an index. And he again emphasized the need of a zero storage temperature to protect the quality of the product.

There was much interest at the conference in frozen food locker plants. Opinion was divided, but the preponderance seemed to be on the side of the complete service locker (which is equipped to prepare, blanch, wrap and freeze) as the only profitable kind.

A suggestion on how to improve packaging of frozen products was made by R. Brooks Taylor of the University of Tennessee. He said that corrugated containers are not strong enough to support the weight that might be stacked upon them in the warehouse. The University of Tennessee used 140-point solid fibre containers with a corrugated liner in shipping fruits stacked nine containers high.

Formulation of Food Standards to Begin

Factual and other information pertinent to standards for tomato products, egg products and certain canned foods will be considered by the Food Standards Committee appointed under the Federal Food, Drug and Cosmetic Act at its first meeting the week of Nov. 7. Information of this type will be welcomed from food manufacturers and should be addressed to the Secretary of the Food Standards Committee, Food and Drug Administration, U. S. Department of Agriculture, Washington, D. C. Such information should be received by Nov. 5.

This meeting is not a public hearing, but is for the purpose of determining those factors which may be embodied in proposals for a public hearing. The standards to be considered include identity standards for tomato products (juice, puree, paste and catsup), identity standards for egg products (liquid, frozen and dried eggs, and liquid frozen and dried egg yolk) and identity and quality standards for canned peaches, pears, apricots, cherries, red sour pitted cherries, tomatoes, peas and dry peas.

CONVENTIONS

NOVEMBER

Oct. 31–Nov. 4—American Bottlers of Carbonated Beverages, Commerce Hall. Port of New York Authority Bldg., New York.

2– 4—Association of Pacific Fisheries, Hotel Del Monte, Del Monte, Calif.

14–16—National Cooperative Milk Producers Federation, Netherlands-Plaza Hotel, Cincinnati.

28–30—Associated Grocery Manufacturers of America, Waldorf-Astoria, New York.

DECEMBER

9–10—Northwest Frozen Foods Association, New Washington Hotel, Seattle. (Dates are tentative.)

"Area of Production" Defined by Andrews

Definitions of "area of production" as used in providing exemptions under the Fair Labor Standards Act of 1938 were announced on October 21 by Administrator Andrews. The definitions provide that the first processing or employment will be regarded as taking place within the "area of production" if it is conducted on a farm on commodities produced exclusively on the farm or if the commodities processed are obtained in the immediate locality of the processing establishment and the number of employees does not exceed seven.

The definition of "area of production" was required by Sec. 7 (*c*) of the Act which provides an exemption from hour provisions for a total of not more than fourteen work weeks in respect to employees engaged in the first processing of an agricultural or horticultural commodity during seasonal operations.

Ways to Improve Safety Discussed at Meeting

Growing interest in industrial safety is clearly evidenced by the record registration of 9,000 at the October 10-14 congress of National Safety Council in Chicago.

At the meetings of the food section, particular emphasis was placed on methods and practices to get both the management and the employees safety conscious. C. W. Turning, Safety Director of Society of Grain Elevator Superintendents, Duluth, warned that "let well enough alone" is a poor attitude for the elimination of accidents. G. H. Sibley, Jewel Tea Co., Barrington, Ill., advised that "accident statistics are valuable in eliminating the causes of accidents, but don't become buried in a mass of figures and forget the human side of the program." William F. Biggs, Hiram Walker Co., Peoria, Ill., declared that "when a foreman can take safety consciousness from the posters, lectures and records and deposit it securely between the ears of his workers, he will have installed the most dependable safety device industry will ever find."

"Management is responsible for every injury that occurs in industry" is the belief of George H. Steele, Ralston-Purina Co., St. Louis. "Management is responsible when it fails: (a) to provide a safe place in which the employee can work, (b) to select the best type of employee for the job, (c) to train the employee correctly to enable him to do his work without likelihood of accident and (d) to recognize potential hazards that exist in connection with the employee's work."

Henry G. Schaffner, treasurer of Schaffner Bros. Co., Erie, Pa., said that "an executive whose only outlook on safety is through his ledger is not the type of executive who is worthy of his title."

L. F. Engelhardt, assistant superintendent of Armour & Co.'s Chicago plant, declared that "an executive's responsibility to a workman is to keep him on the job, healthy, cheerful and all in one piece. Contrary to common belief, safety is not something that will boil up from the bottom. If safety is to permeate the fiber of an organization it must percolate down from the top. Every official in our company, from the president down to the newly appointed sub-foreman is a leader in the safety movement."

Cooperative Research Recommended to Brewers

Cooperative research ought to be instituted in the brewing industry because it is the most economical method of solving technical problems that affect everybody in the industry. This was a point made by Dr. L. V. Burton, editor of FOOD INDUSTRIES, in a speech before the Master Brewers Association of America, which met in Buffalo the week of Oct. 2. And this need was also touched upon by other speakers.

Examples of successful cooperative research in the packing, canning, bottling and baking industries were cited by Dr. Burton to bear out his contention.

Cooperative research is needed in the industry to study the malting qualities of new barleys, the master brewers were told by James G. Dickson, a professor at University of Wisconsin and an agent of the Bureau of Plant Industry. The responsibility for experimental brewing studies and brewing tests of new barley selections rests with the industry, he said. The industry has reached the stage where it can no longer look to European institutes for this type of information, Professor Dickson said. The cost of not having research laboratories is far greater than the expense of supporting them, in the opinion of Professor Dickson.

Speaking on "Some Popular Conceptions and Misconceptions about Beer and Brewing," Morris A. Pozen, Brewing Research Laboratories, New York, showed what scientific work has done to expose fallacies, and he urged the master brewers to have an open mind.

Food Engineering Course Set Up by Oklahoma A&M

Food engineers, a type of professional man widely needed in the food industries but as yet not trained by the universities, are to be educated at Oklahoma A & M College, Stillwater, Okla. The division of engineering of this school has set up a new four year curriculum which will lead to the degree of Bachelor of Science in Food Engineering. The purpose of the course is to produce men particularly qualified to cope with the technical problems encountered in operating a food plant and distributing its products.

The food engineering curriculum includes work in mathematics, physics, thermodynamics, mechanics, machine shop practice, steam power plants, steam and gas laboratory work, refrigeration, strength of materials, industrial management, electrical engineering and safety engineering. Then there will be courses in biology, bacteriology, accounting, economics, food chemistry, food bacteriology, colloid chemistry, frozen foods, beverages and butter and cheese. Rounding out the training will be courses in food merchandising and personnel administration.

19,000 Attend Dairy Industries Exposition

No less than 19,000 people attended the Dairy Industries Exposition held in Cleveland the week of October 17. This exceeded by 3,000 the largest previous attendance, namely, that at Atlantic City in 1936.

Held in conjunction with the convention of International Association of Milk Dealers and International Association of Ice Cream Manufacturers, the exposition included 315 commercial displays and some 800 pieces of modern machinery.

As a step toward better public relations, National Dairy Council invited to the exposition a representative group of 1,000 professional men and women who exert public influence. Interest in public relations was also evidenced at the meetings. Roberts Everett, executive vice-president of the Dairy & Ice Cream Machinery & Supplies Association, told the ice cream manufacturers that: "The essence of good public relations for business is that business be on the level with employees and customers and also that it be a good neighbor, up and down the street . . . And then it must tell, not brag, of its deeds."

National Advertising Planned for Butter

Appointment of a 23-member committee to work out ways and means of advertising butter on a nation-wide scale was the long-range result of a joint conference which was held in Chicago, October 5.

Participating in the conference were officers of and spokesmen for the Tri-State Dairy Committee of Minnesota, Wisconsin and Iowa, American Butter Institute, National Cooperative Milk Producers' Federation, National Association of Local Creameries and National Association of Direct Cream Shipper Creameries. In all, sixteen states were represented at the conference.

The advertising program is to be financed by some plan similar to that now being worked out in Minnesota. This plan calls for an assessment upon the butterfat produced and becomes effective when a 75 per cent representation of butterfat production enters into a contract agreement to participate in the plan and pay the assessments.

In Minnesota, the assessment was set at 50 cents per 1,000 lb. of butterfat, but for the national program the assessment may be lower.

A byproduct of this conference was the appointment of a separate five-member emergency butter committee to participate in an independently organized retail-store movement for a six-weeks' to four-months' high-power sales drive on butter through 180,000 retail outlets from coast to coast.

CAPITAL VIEWS

OLEO CODE—Sort of a moral code for trade conduct is set up by the new trade practice rules for the oleomargarine industry promulgated by the Federal Trade Commission on Sept. 27. Better merchandising practice for 400,000,000 lb. of this table fat is expected.

LEAD TOLERANCE RAISED—Foods may contain up to 0.025 grain per pound of lead without endangering the health of the consumer, according to the findings of Public Health Service. The Food & Drug Administration has therefore raised the limit from 0.018 to the higher figure for various fruits. Those processers of any fruits or vegetables who really need the higher standard can now freely proceed in the use of goods slightly more contaminated by insecticide residues than was formerly permissible. But no increase in the fluorine or arsenic limits will be tolerated. They remain at 0.01.

ILLEGAL DISCOUNTS—The Federal Trade Commission seeks to prevent the sale of locks on a price list which offers discount to purchasers taking more than a given quantity *per year*. The Commission charges that there is no advantage to the seller in thus favoring buyers unless they place individual orders in larger quantity or less frequently than other customers taking a smaller dollar value per year. Thus the Commission proceeds to define as illegal those quantity discounts based on time totals, which disregard the differences in cost of rendering the service.

FOOD COLOR SHORTAGE—Next June when the new food and drug law applies also to cosmetics the makers of those goods will be permitted to use only certified colors of the coal-tar-dye type. Chief W. G. Campbell, therefore, urges that cosmetic makers submit a list of their prospective needs for such coal-tar colors in order that ample supplies of certified goods may be available. Food users of these colors should note this situation lest the cosmetic makers deprive them of supplies normally adequate by monopolizing the market temporarily.

STRATEGIC FOODS—The war scares of September again stirred government interest in so-called strategic materials for which war-time shortages are seriously feared. In the list of 21 such industrial commodities, most important to food men are coffee and coconut shells. The rest of the list is made up of metals, chemicals, drugs or industrial commodities like hides, rubber and silk. The secondary list of 54 "critical" materials contains several other foods, but is principally mineral and industrial in nature. This merely means that Uncle Sam is practically self-sufficient in food supply, even in periods of interrupted international trade.

Maryland Will Train Food Technologists

Young men are to be prepared for careers in the food industries by a new course in food technology at the University of Maryland, College Park, Md. The course will include intensive training in biology, chemistry and engineering. Particular emphasis will be placed upon basic training in general organic and qualitative chemistry, general and food bacteriology and sanitation, principles of mechanical, electrical and chemical engineering and unit operations in modern factories.

To learn how to apply practically the theoretical knowledge gained in the course, students will work in plants during summer months.

Prominent members of industry will function as an advisory council for the food technology course. This council includes Dr. L. V. Burton, editor of FOOD INDUSTRIES; W. L. Lewis, Director of Institute of American Meat Packers, C. P. McCormick, president, McCormick & Co.; F. F. Fitzgerald, vice-president of American Can Co.; J. T. Menzies, president of Crosse & Blackwell, Inc.; Frank Shook, secretary of Tri-State Packers Association; and R. S. McBride, consulting chemical engineer and Washington representative of FOOD INDUSTRIES.

Fish Industry Told How to Boost Sales

Shortcomings of the fishing industry were aired by plain spoken speakers at the National Fisheries Convention and Exposition held in Boston, Oct. 6-9. A big problem in the industry is how to get people to eat more fish. In answer to this, Ivan C. Miller, distribution editor of FOOD INDUSTRIES, said: "Quality fish brought within reach of the housewife, and maintained at the standard of quality at which it was prepared, will build its own acceptance with surprisingly little assistance from promotional efforts. Our 130,000,000 people do not lack a desire for fish; what they lack is the conviction that good fish can be obtained. If frozen fish can be prepared with a quality only exceeded by fish really fresh from the water, then the problem of the frozen producer is to get his frozen fish—a quality product—to the housewife while still frozen in a condition unchanged from the time of freezing. This requires low temperature storage at point of sale."

"How Do We Sell More Fish and Make a Profit Doing It?" was the subject of a speech by Don Mitchell. Touching on the reason why the housewife doesn't buy more fish, he said: "It is not because she does not know about fish, but that she doesn't think about fish—that is, except possibly once a week." To increase per capita consumption, Mr. Mitchell said that the fish must be made available through broad coverage of the market, the fish must be put up in a convenient packaged form, the quality must be maintained for repeat sales and the housewife must be acquainted with the facts about fish. Mr. Mitchell advised those interested in the development of a huge market for packaged frozen fish to make a small war chest available to determine basic market and sales data.

Bakers Show Interest In Public Relations

Continuing its program for better relations between its industry and its products-buying public, American Bakers' Association met in its 41st annual meeting in Chicago, Oct. 16-19. President L. J. Schumaker reminded the industry that the Federal Government is investigating all lines of business. And he warned the members that they should study their industry and its place in the world of business to correct wasteful practices and justify the industry's way of doing business.

"Consumer income," said Royal F. Munger, financial editor, *Chicago Daily News*, "is the first requisite in finding a market for bread or any other merchandise. The baker today does not compete as much with other bakers as with producers of other consumer products."

As a contribution to the program for the meeting, spokesmen for the American Society of Bakery Engineers reviewed the activities of that Society's bread consumption committee. Rowland J. Clark, Shellabarger Mills, Salina, Kan., summarized the investigated remedies for a 34 per cent decline in per capita flour consumption in 33 years under the headings of (*a*) improvement in quality of the loaf itself as to flavor and taste appeal and (*b*) improvement in organization and practice for handling of the bread after baking.

An unusual feature of this year's meeting was the serving of month-old frozen bread at Monday's luncheons. Vote in a blind test against day-old bread gave a 30 per cent preference for frozen bread, 30 per cent no choice, and 40 per cent for the fresh bread.

Initiating its activities as a small organization, the Bakery Sales Association announced that next year it will hold a separate convention. Its contribution to this year's program was a discussion on "Training Salesmen," by J. P. Woolsey, president, Heilman Baking Co., Inc., Madison, Wis.

Larger Supply of Meat Forecast at Convention

From the first day of the technical sessions, attendance at the 33d annual convention of the Institute of American Meat Packers registered a new high. As in previous years, the subject of widest interest was the possible supply of livestock. Production reports show that the total production of meat and lard for 1938 was greater than in 1937 and about the same as in 1936. This was so, in the face of continued hog shortage, because of the increased supply of cattle and lambs. Meat supply for 1939 is expected to be about 750,000,000 lb. greater than in 1938 with the increase coming mostly from pork and lard. Beef supply is expected to be about the same in quantity but better in quality. Building up of feeder herds is expected to continue. Increasing supply of meats is expected to continue until into the 40's.

Cost figuring, yield determination and meat merchandising received more than usual attention.

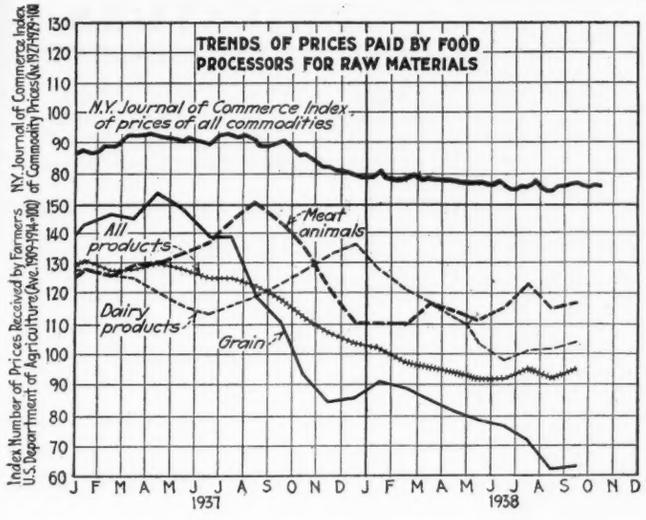
The increasing importance of proper packaging as a sales tool was stressed by Ivan C. Miller, distribution editor of FOOD INDUSTRIES. Mr. Miller summed up the situation in these words: "How your package must talk—only you can make it talk—and make it you must, remembering that as more items are packaged and as each is better packaged, your package must talk fast and with conviction in the few seconds it has to sell."

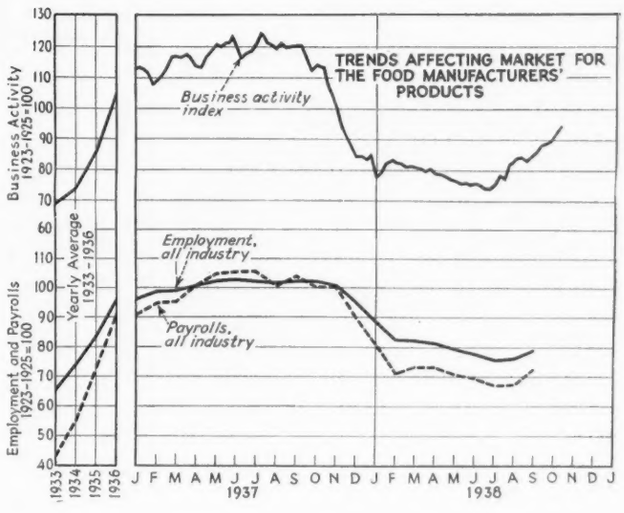
Among the new developments seen at the convention exhibits were: the truly air-conditioned smoke house, which is operated under precision instrument control; the stoker-fed smoke producer in which the sawdust volatiles are distilled into the smoke house free from fine, flying ash; mechanical presses for shaping bacon bellies immediately and without freezing; meters for accurate determination of amount of pickle injected into meat cuts; automatic sausage linking machine; small capacity flake ice making machine; rustless and corrosion-resisting meat loaf molds; parchment casings with zipper opening; printed natural casings and spices treated to lower possibility of bacterial contamination.

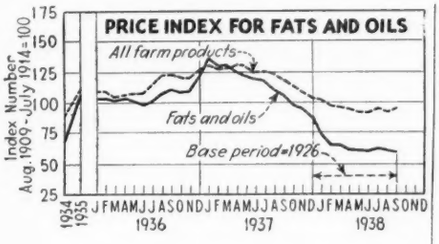
Pickle Packers Meet; Encouraged by Reports

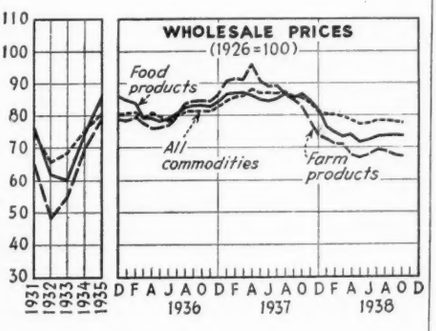
Encouraged by the depleted state of distributers' shelves and reports of increasing consumption of pickles, members of the National Pickle Packers' Association took stock of their industry at their fall meeting in Chicago on Sept. 28.

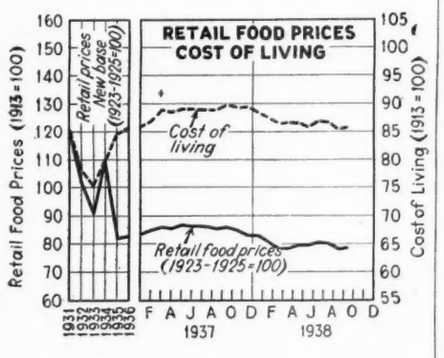
Sales reports for June, July and August indicated a total consumption of more than 1⅕ million bushels of pickles, leaving the distributers' stock at lowest level in years—estimated at a million bushels lower than a year ago. This average monthly consumption of 400,000 bu. of pickles is 25 per cent over the monthly average for the previous five months. With a total stock on hand of 1⅕ million bushels more than on Sept. 1, 1937, these reports made the pickle packers more optimistic for the coming year than the cold statistics would justify.


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
N.Y. Journal of Commerce Index of prices of all commodities
All products
Meat animals
Dairy products
Grain
Index Number of Prices Received by Farmers, U.S. Department of Agriculture (Ave. 1909-1914=100)
N.Y. Journal of Commerce Index of Commodity Prices (Ave. 1927-1929=100)
J F M A M J J A S O N D J F M A M J J A S O N D
1937
1938


TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Business activity index
Employment, all industry
Payrolls, all industry
Business Activity 1923-1925=100
Yearly Average 1933-1936
Employment and Payrolls 1923-1925=100
1933
1934
1935
1936
J F M A M J J A S O N D J F M A M J J A S O N D J
1937
1938


PRICE INDEX FOR FATS AND OILS
All farm products
Fats and oils
Base period=1926
Index Number Aug. 1909 - July 1914 = 100
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1934
1935
1936
1937
1938





Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *Business Week*. The cost of living index is from the National Industrial Conference Board. The data on fats and oils are from the Bureau of Raw Materials for American Vegetable Oils and Fats Industries.

BUSINESS TRENDS

Commodity Prices Decline As War Threat Vanishes

Moving just as rapidly in reverse as in forward, the general commodity price level in the month ending Oct. 17 reached a war-scare-induced peak and then returned to pre-scare levels. With the rattling sabers again quiet, at least for the present, domestic and world trade influences asserted themselves. Food commodity prices continued their slow decline, as the harvest of bumper crops reached completion. In contrast, rising levels of industrial activity brought additional increases in price to commodities such as non-ferrous metals and hides. The effect of declining food prices was strong enough, however, to bring the general price level somewhat down.

Corn, wheat, cottonseed oil, lard and cocoa were among the foodstuffs that showed declines in price from Sept. 17 to Oct. 17. Beef was steady in this period, but lamb and pork showed declines. Coffee, barley, cheese and sugar increased in price, as did eggs, while butter was unchanged.

For the month from Sept. 15 to Oct. 15, Fishers commodity index was off from 80.7 to 80.3. The low point this year for this index was on Aug. 20, when it registered 79.9. The commodity price index of the National Fertilizer Association stood at 73.2 on Oct. 8, compared to 73.6 on Sept. 10. In contrast, the New York Journal of Commerce's weekly index of business activity rose from 77.4 on Sept. 10 to 86.3 on Oct. 8.

The fact that commodity prices have declined while business has improved is not strange in the light of the disturbed conditions of recent weeks. Business activity has been definitely improving ever since July and present indications are that this improvement will continue for some months. At first, commodity prices kept pace with this improvement. Then reports of huge harvests drove them down. Next, the possibility that a war-mad Europe would buy heavily of American commodities sent most prices up. Since Oct. 1, the peacetime trend has been reasserted. Once this adjustment is fully made, it is possible that the slow rise of earlier months will be resumed and then continue until early Spring.

1938 Crop Figures

With the October report of the Crop Reporting Board of the U.S. Department of Agriculture at hand, approximately final figures are available for most crops.

One point of particular interest is the relatively high average yield per acre reported for 1938. This yield, while 8 per cent below 1937, was higher than any other season since 1920 and was 8.6 per cent above the 1923–1932 pre-drought average.

Indicated production of 14,262,000 bags of dry, edible beans is the third largest crop on record, exceeded only by 1935 and 1937 production. Soybean production is estimated at 43,684,000 bu., the largest crop so far. Peanut production is also estimated at the record figure of 1,348,500,000 lb., compared to 1,291,655,000 lb. in 1937. Sugar beet production is given as 10,675,000 tons, compared to a 1937 figure of 8,749,000 tons. The Oct. 1 estimate for potatoes was 373,275,000 bu. compared to a 1937 yield of 393,289,000 bu. Buckwheat yield is estimated at 6,997,000 bu., 3 per cent up from last year, but 18 per cent below the 1927–1936 average.

Fats and Oils Supply

Cottonseed oil was the leading factor in the supply of edible fats and oils during the 1937–38 cotton crop year. This year, with a greatly curtailed supply of this oil, shifts to the use of other fats and oils in manufactured foods are in order. Already, lard is going into consumption at an increased rate, indicating that favorable lard prices are encouraging its use as shortening. Soybean oil is more plentiful this year than last, and is therefore likely to be a more important factor in the supply market. Reports of imports indicate a greater inward flow of coconut oil, which may replace some of the cottonseed oil requirements of margarine manufacturers.

It is not unlikely that the edible fats and oils supply pattern for 1938–39 will be nearer the normal of the past five crop years.

Butter Stocks at High

Production of creamery butter in August again hit a high point, with an output of 167,204,000 lb. This figure compared to 147,058,000 lb. in August, 1937 and an August average for the years 1929–36 of 151,582,000 lb. For the period Jan.-Aug., 1938, butter output was 1,251,610,000 lb., 8 per cent above the same period in 1937 and 6 per cent above the 1929–36 average.

That this butter production is overproduction is evident from the rapid increase in storage stocks, which stood at 210,351,000 lb. on Oct. 1, 1938, compared to 118,697,000 lb. on Oct. 1, 1937 and a five-year average for the date of 135,223,000 lb. On Sept. 1, 1938, the butter in storage was 201,543,000 lb., on Aug. 1, 1938, the total was 172,622,000 lb. and on July 1, 1938, it was 120,351,000 lb. Of the Oct. 1, 1938, total, 97,868,000 is in the hands of the Dairy Products Marketing Association, a government agency holding the commodity for resale or relief. It still, however, must be considered as a part of the general supply.

Construction News

	Pending (thousands)	Awarded Oct. (thousands)	Total Awarded 1938 (thousands)
Bakery	.....	.....	$688
Beverages	$220	$80	3,962
Canning and Preserving	40	.....	240
Confectionery	.....	.....	62
Grain Mill Products	65	60	770
Ice Manufactured	40	100	360
Meats and Meat Products	190	40	1,898
Milk Products	555	120	802
Miscellaneous	165	200	4,834
	$1,275	$600	$13,616

It is interesting to note that this relatively great production of butter and the consequent large supply at reasonable prices, has not adversely affected sales of oleomargarine. Sales of this product, as represented by purchase of tax stamps, totaled 254,758,439 lb. for the first eight months of 1938, 5.4 per cent over sales for a like period of 1937. However, oleomargarine sales in August, 1938, at 25,289,000 lb., were 4.8 per cent off from sales in August, 1937.

Wheat Will Be Low

Now that most facts are known concerning the current wheat crop, it seems to be a practical certainty that wheat prices will remain low throughout the remainder of the current crop year. The world supply between Aug. 1, 1938, and Aug. 1, 1939, excluding Russian and Chinese production, but including probable Russian exports of 45,000,000 bu., will be about 4,984,000,000 bu., the largest supply on record, according to the Food Research Institute.

This supply of wheat is so much above requirements that the carry-over into the next crop year is expected to be more than a billion bushels. As something like 40 per cent of this surplus is represented by the excess of the United States crop over domestic requirements, there seems little likelihood of improvement in United States wheat prices.

Business Still Goes Up

Registering a gain for the month ending Oct. 15 that was just about double the gain of the preceding month, business has continued to move upward, taking the war scare in its stride. This movement, starting in the week ending June 18, has brought the *Business Week* index of business activity from a low for the year in that week of 74.3 to a current figure of 98.6, a rise of 32.70 per cent in 17 weeks. The gain in this index for the four weeks ending Oct. 15 was 10.29 per cent.

For the month, other indicators of business activity also rose. Automobile production increased from 16,100 (low point for the year) in the week ending Sept. 17, to 50,540 in the week ending Oct. 15. Steel production rose from 45.3 per cent of capacity to 51.4 per cent in the same period. Electric power production also rose. Engineering construction continued at good levels, the year to date being 7.7 per cent over the period of 1937.

The United States Department of Labor indexes of wholesale prices for the four weeks from Sept. 17 to Oct. 15 showed a drop of 0.76 per cent for the general index, a drop of 2.03 per cent for the farm price index, and a drop of 1.60 per cent for the food price index. The weekly weighted commodity price indexes of the *New York Journal of Commerce*, in the period from Sept. 24 to Oct. 22, fell 0.79 per cent for the general index, dropped 6.63 per cent for the grain price index, and fell 1.75 per cent for the food price index.

INDICATORS

TOMATO PRODUCTION for canning in 1938 was estimated at 1,499,000 tons on Oct. 12, off 24 per cent from the 1,973,800 tons produced in 1937.

GREEN LIMA BEAN PRODUCTION for canning in 1938 was estimated at 27,330 tons on Oct. 12, compared to 22,840 tons in 1937.

BEET PRODUCTION for canning in 1938 was estimated at 80,830 tons on Oct. 12, compared to 62,560 tons in 1937.

ASPARAGUS PACK, both regular white and all green, in 1938 totaled 2,433,554 cases, all sizes, compared to 2,703,966 cases in 1937.

FLOUR MILLED in September, 1938 amounted to 6,236,170 bbl., according to reports for mills with about 60 per cent of total U. S. output, as reported by *The Northwestern Miller*. This compared to 5,923,116 bbl. in September, 1937.

SALMON PACK in Alaska totaled 6,719,454 cases in 1938, compared to 6,513,070 cases in 1937, according to the New England Fish Co. of Seattle.

FRUITS, quick-frozen and cold packed, in storage on Oct. 1, 1938, totaled 147,247,000 lb., compared to 134,178,000 lb. a year before, and a 1933-37 average for Oct. 1 of 86,672,000 lb.

VEGETABLES, frozen, in storage on Oct. 1, 1938, amounted to 69,239,000 lb., compared to 26,690,000 lb. on Oct. 1, 1937.

CHEESE, all types, in storage on Oct. 1, 1938, totaled 141,120,000 lb., compared to 117,610,000 on Oct. 1, 1937 and a 1933-37 average for the date of 117,610,000 lb.

EGGS, case equivalent, in storage on Oct. 1, 1938, totaled 7,914,000 cases, compared to 11,293,000 cases a year before, and a 1933-37 Oct. 1 average of 9,766,000 cases.

POULTRY, frozen, in storage on Oct. 1, 1938 was 59,950,000 lb. This compares to 61,721,000 lb. a year before and a 1933-37 average for the date of 57,795,000 lb.

MEAT, all kinds, in cure and storage on Oct. 1, 1938, totaled 369,859,000 lb., compared to 367,025,000 lb. on Oct. 1, 1937, and a 1933-37 average for Oct. 1 of 547,761,000 lb.

LARD in storage on October 1, 1938 was 90,263,000 lb., compared to 72,614,000 lb. a year before, and an October 1 average for 1933-37 of 107,975,000 lb.

WEEKLY FOOD INDEX of Dun & Bradstreet, Inc., stood at $2.42 on Oct. 11, compared to $2.82 a year before.

MEN, JOBS and COMPANIES

INDUSTRY

» ALTA VISTA CREAMERY CO., Fort Worth, Tex., is completely modernizing its plant at a cost of more than $150,000. It plans to introduce vacuum bottled milk with airtight metal caps.

» ANHEUSER-BUSCH, INC., St. Louis, will erect a $50,000 grain storage plant consisting of four concrete tanks 130 ft. high and 20 ft. in diameter.

» ARCTIC FISHERIES, LTD., Ontario, a newly organized $1,000,000 company, plans to establish a northern base on the Albany River to handle large quantities of sturgeon for the American market.

» L. L. CORYELL & SONS CO., Lincoln, Neb., has completed a $150,000 frozen food plant. The products to be frozen include beef, pork, lamb, eggs, poultry, beef stew, oyster stew and fruits and vegetables.

» GENERAL SEAFOODS CORP., Boston, has acquired all of the assets and business of Bay State Fishing Co., also of Boston. Both companies are engaged primarily in the packaged fish business, obtaining their supplies largely from their own trawlers.

» JORY PACKING CO. has installed quick freezing equipment at its plant in Salem, Ore., to increase production of whole kernel corn and corn on the cob.

» J. A. FOLGER & CO. is constructing at Houston, Tex., a $177,000 coffee roasting plant which will be three stories high and contain 26,400 sq.ft. of floor space. The plant will have a daily capacity of 50,000 lb. of coffee.

» LADOGA CANNING CO., Indianapolis, recently purchased the canning plant of Sears & Nichols at Washington Court House, Ohio. It will operate the plant throughout the year.

» MILWAUKEE COCA-COLA BOTTLING CO. will erect a new $150,000 plant.

» MORGAN PACKING CO., Austin, Ind., recently purchased 15 corn filling machines with a total capacity of about 100,000 cans per hour. These machines will be used in several Morgan plants.

» ROCKY MOUNTAIN PACKING CORP. has equipped a plant at Ogden, Utah, for quick freezing fruits and vegetables. Air-blast freezing with temperatures as low as **–25 deg. F. will be employed.** The corporation will distribute its quick frozen foods through Colville Ice Cream Co.

» STOKELY BROS. & CO. has equipped a new plant in Santa Cruz, Calif., with a monorail system for freezing vegetables. Products to be frozen are placed in trays which are put on carriers that are moved along a monorail by power. The monorail carries the products through the freezing room and into the packaging department. Freezing is by air-blast at a temperature of –25 deg. F. or colder.

GET NEW POSITIONS IN GENERAL FOODS

Austin S. Igleheart has been appointed executive vice-president of General Foods Corp., New York. He previously was vice-president in charge of sales and merchandising. Ralph S. Butler has been made promotional sales manager with supervision over merchandising and advertising. A vice-president, he has been in charge of advertising since 1926. William M. Robbins, sales manager of General Foods Sales Co., Inc., in charge of the field sales force, has been elected a vice-president for the sales company. Charles G. Mortimer, Jr., vice-president of the sales company, was appointed advertising manager for the corporation.

PERSONNEL

» PATRICK BUCKLEY has been elected chairman of the board of Froedtert Grain & Malting Co., Milwaukee, succeeding Kurtis R. Froedtert, who continues as a director.

» R. L. CALHOUN has been named manager of Neenah Milk Products Co., succeeding O. B. Pratt, who has joined the sales department of Badger Cooperative Creamery, Shawano, Wis.

» ODIN CHRISTENSON, Nelsonville, recently was elected president of the Wisconsin Butter Makers Association.

» K. H. CLARKE, for the past ten years engaged in management supervision of

various Swift & Co. plants, on Oct. 10 was made vice-president of the company in charge the purchasing, byproducts and allied departments.

» DANIEL W. CREEDEN resigned recently as vice-president of Swift & Co., with whom he had been for 25 years, and has gone with Libby, McNeill & Libby, Chicago, as executive vice-president.

» JAMES J. CUFF, former president of Cuff Packing Co., has joined Danahy Packing Co., Buffalo, in an executive capacity.

» GEORGE V. DAYTON, Towanda, Pa., has been reelected president, and P. S. Schumacher, Cohocton, N. Y., secretary-treasurer of Buckwheat Association, Inc.

» L. F. ENGELHARDT has been transferred from Chicago to Omaha by Armour & Co. to become superintendent. He had been assistant superintendent at Omaha for a number of years prior to 1934, when he went to Chicago.

» AL ERDA, formerly with Schwarz Laboratories, Inc., New York, on Oct. 3 became brewmaster at the Iroquois Brewery, Buffalo.

» IVAN FRANZ has been appointed manager of the Leslie (Mich.) Grain & Produce Co.

» P. L. GRANGE, formerly manager of Swift & Co. at Keokuk, Iowa, is now manager at Conway, Ark., for the same company.

» D. A. GREENWOOD, formerly engaged in research at University of Chicago on a fellowship sponsored by Corn Industries Research Foundation, is now on the research staff of Institute of American Meat Packers.

» C. B. GUSTAFSON, formerly connected with the Agricultural Experiment Station at Purdue University, has been made head of the cereal research laboratory of Superlite Co., Dallas, Tex.

» M. E. PARKER, manager of production of Beatrice Creamery Co., Chicago, has been appointed a director of American Dairy Science Association for three years.

» ALFRED HOLZ has been appointed brewmaster by American Brewing Co., Parkersburg, W. Va. Mr. Holz was formerly brewmaster at Atlantic Co., Chattanooga.

» EDWARD W. KING has been appointed general manager of Acme Farmers Dairy, Ltd., Toronto. He formerly was secretary-treasurer of the company and of Eastern Dairies, Ltd.

» CARL LINS, formerly of the Marathon City Brewing Co., now is brewmaster of Park Brewing Co., Hancock, Mich.

» CHARLES W. LOVE, formerly vice-president and sales manager of Halsey, Stuart & Co., Inc., Chicago, has been made general manager of Horlicks Malted Milk Corp., Horlick, Wis.

» C. G. MARKOFF, vice-president and director of Cudahy Packing Co., retired Nov. 1 after 38 years with the company.

» WILLIAM D. MCINTYRE, Tender Krust Baking Co., Eau Claire, is now president of Wisconsin Bakers Association.

» JOHN S. MERKTE, master brewer for Frontenac Brewing Co. and Grants Spring Brewing Co. of Hamilton, Ont., for the past fifteen years, has been named brewmaster for Auto City Brewing Co., Detroit.

» EUGENE A. MOSS, until Oct. 10 assistant to the president of Swift & Co., is now manager of the company's Chicago plant.

» HARRY O'GRADY has succeeded Peter A. Carney as superintendent of Cudahy Packing Co.'s plant at Sioux City, Iowa. Mr. Carney was transferred to Omaha as assistant general superintendent of the company's northern division.

» W. C. PRESSING, formerly with Fairmont (Minn.) Canning Co., has joined Frosted Foods Sales Corp., New York, as a field representative in the production department.

» JAMES RIEDL has been named manager of the Burlington (Wis.) Brewing Co. Previously he was brewmaster of Superior Brewing Co., Chicago.

» A. F. THOMASSON, former city manager of St. Petersburg, Fla., is now credit manager and controller of Florida Milk Co. and also assistant to W. E. Wells, vice-president and general manager.

» S. F. TUPPER, Olive Products Co., Oroville, Calif., again heads up California Olive Association.

» G. W. SHARPE, Beech Nut Packing Co., Canajoharie, N. Y., again has been chosen chairman of Associated Coffee Industries of America.

» WILLIAM SIEBENBERG, for ten years with Schwarz Laboratories, Inc., New York, has resigned to accept a position as chemist in charge of the new laboratory of Gunther Brewing Co., Baltimore.

» PETER R. VIVIANO has been elected secretary of the V. Viviano & Bros. Macaroni Mfg. Co., St. Louis. He replaces Salvatore Viviano, who resigned and was named treasurer.

» J. H. WOOD, general manager of the San Antonio division of 7-Up Texas Corp., has become vice-president of the company.

DEATHS

» SALVATORE BUFFARDI, treasurer and cofounder of Ferrara Panned Candy Co., Chicago, Sept. 27.

» PHILIP ELBERT, 57, production manager of South Side Baking Co., Indianapolis, recently.

» CLEM FANGMAN, 56, former vice-president of Hampton Cracker Co., at Louisville, Oct. 7.

» GEORGE O. GALLAP, retired district superintendent of Beech-Nut Packing Co., Syracuse, Sept. 19.

» FRANK L. GOETZ, 69, president of M. K. Goetz Brewing Co., St. Joseph, Mo., Sept. 17.

» EDWARD W. HASKIN, 72, vice-president and secretary of Great Atlantic & Pacific Tea Co., Oct. 18, at Pelham Manor, N. Y. He had been with the company 58 years and was administrative vice-president for 30 years.

» JOHN ROBERTS, 72, chairman of the board, Miller & Hart, Chicago meat packers, and founder of Roberts & Oakes, Chicago, Oct. 15, of heart attack.

» SAMUEL SCHLOSSER, Sr., 64, of Schlosser Bros., Plymouth, Ind., and president of American Butter Institute in 1916, Oct. 11, at Frankfort, Ind.

» GEORGE F. STEIN, 74, founder of a Buffalo brewery bearing his name, Oct. 10.

» JOHN P. STREET, 69, for seventeen years secretary of Association of New York State Canners, Sept. 22, at Rochester, N. Y.

ASSOCIATED INDUSTRIES

» ALLEGHENY LUDLUM STEEL CORP., with offices at Brackenridge, Pa., has been formed by the merging of Allegheny Steel Co. and Ludlum Steel Co.

» CROCKER-WHEELER ELECTRIC MFG. Co., Ampere, N. J., has appointed Wallace K. Brown vice-president and general sales manager.

» GAYLORD CONTAINER CORP. will establish a manufacturing plant in Milwaukee.

» GOODYEAR TIRE & RUBBER CO., INC., Akron, has expanded its Pliofilm sales division and A. F. Landefeld is manager of Pliofilm sales.

» HORIX MFG. CO., Pittsburgh, has promoted Tom McLay to sales manager.

» INTERNATIONAL HARVESTER CO., Chicago, has appointed A. C. Seyfarth advertising manager to succeed Frank W. Heiskell, who resigned after 45 years of service.

» OWENS-ILLINOIS CAN CO., Toledo, has appointed George E. Kummerow Chicago branch manager.

» WEBSTER MFG. CO., Tiffin, Ohio, is reorganizing and will be known as Webster Manufacturing, Inc., remaining under the present management.

Freezing Methods Evaluated

(Continued from page 621)

half as large. Blanched asparagus when frozen contained much larger crystals than unblanched. When stalks of asparagus were frozen with one end immersed in syrup at 0 deg. F. and the other end in air at the same temperature, there was a measurable difference in size of ice crystals and firmness of tissue at the two ends.

Leakage from plant tissue that has been frozen and thawed is due almost entirely to ruptured cell walls. In asparagus, string beans and rhubarb, measuring or counting the ruptured cells gave a fairly accurate basis for estimating or predicting the amount of leakage. When these materials were frozen in direct contact with solid carbon dioxide or by immersion without rupturing cell walls, the leakage was reduced to less than 2 per cent.

Commercial brands of products obtained from the open market produced leakage as follows: blueberries, 6.8 per cent; corn, 3.2 per cent; lima beans, 1.8 per cent; asparagus, 8.6 per cent; spinach, 14 per cent; peas, 2.8 per cent; raspberries, 48 per cent; broccoli, 12 per cent.

Numerous instances have been reported of fruits and vegetables being flabby and structureless after complete thawing, but apparently no effort has been made heretofore to measure this accurately and to associate it with specific treatments of the product. Loss of turgidity in strawberries and other mature fruits, after thawing, seems by many to have been accepted as a condition that could not be overcome. Several investigators have stated that freezing temperatures had little or no effect on physical condition of the thawed product; these were instances in which all contributing factors were unknown or unrecorded.

The average pressure to crush Blakemore strawberries, representing eleven different treatments, was obtained. The number of grams required to crush ranged from 168 for berries frozen by the immersion method to 23 grams with berries frozen in 12-oz. packages, allowed to thaw and then refrozen. Berries frozen by three methods in which they were placed in packages before freezing required an average of 56 grams to crush, while those frozen by three methods in which they were frozen before packaging required 148 grams to crush. Three lots that were thawed and refrozen lost 32 per cent, 62 per cent and 63 per cent, respectively, of the firmness they had before thawing and refreezing. Two lots that were frozen by the immersion process at 0 deg. F. and hardened in direct contact with solid carbon dioxide at –105 deg. F. lost 17 per cent and 30 per cent, respectively, in firmness due to the hardening.

These figures indicate that intimate contact with the refrigerant was much more important than low temperature as such; and an extremely low temperature was less desirable for the preservation of firmness than was moderately low temperature with direct contact. Based on the factor of maintaining firmness, the methods of freezing may be rated as follows: (1) immersion, (2) direct contact with solid carbon dioxide, (3) combination of immersion and solid carbon dioxide, (4) double contact with metal plates after packaging and (5) in cold air after packaging.

The entire report of these investigations is being published as Bulletin 201 of the Georgia Experiment Station, Experiment, Ga. A copy will be sent free by the Station to those in the industry who request it.

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GOOD MIXES

(*Continued from page 635*)

this ideally simple arrangement cannot be attained because a good mix will require some ingredients that cannot be commercially obtained in a powdered form or that, even if powdered, require some auxiliary processing to render them suitable for incorporation with the other portions of the mix. Usually, these auxiliary treatments consist of drying or grinding operations or combinations of these two.

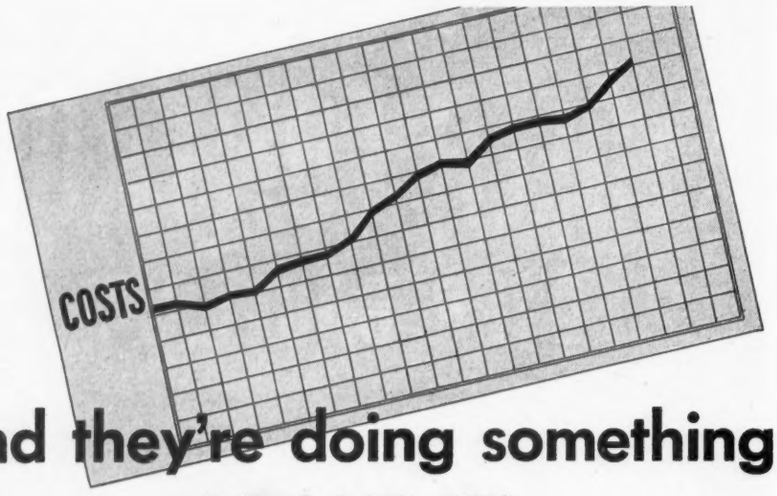
The patented process used by P. Duff & Sons for the production of certain cake mixes is a good example of these auxiliary treatments. Here, molasses is formed into a dough in conjunction with flour and certain other of the mix ingredients. This dough is dried in vacuum apparatus and the dried dough reduced to a powder by grinding. Among other advantages gained by this procedure is the attainment of dried, powdered molasses of outstanding quality because the scorching that always accompanies drying molasses independently is entirely eliminated. This treatment requires considerable heavy machinery. Dough mixers and rollers, vacuum shelf dryers, cooling equipment, hammer mills, and so forth, are among the devices employed.

In general, two kinds of mixing jobs are involved. One, in which all the materials are powdered, is the simpler and can be conducted in any type of efficient mixing machine. The other, of particular application to the production of baking mixes, requires the blending of a plastic or liquid shortening ingredient to a previously made mixture of powdered materials.

For the "cutting-in" of a plastic shortening, a special type of machine is necessary. Several of these have been developed during the last few years. Usually their operation involves the horizontal rotation of a spider fitted with a series of sharp, flat trowels that move close to the mixer. The action consists of progressively cutting up the shortening lumps and rubbing them into the particles of the powder mixture until a homogeneous blend is attained. The longer a machine of this kind is operated the more thoroughly the shortening becomes incorporated into the rest of the mix.

The length to which this absorption of shortening should be permitted to go is a specific problem for every mix. It involves a consideration of the flowing properties desired in the finished mix and of the effects of shortening penetration into flour particles on the final operation of the mix and on its keeping qualities. The incorporation of shortening into a mix by spraying is a modification of this procedure. Here, either naturally liquid material may be used or plastic shortenings may be melted and sprayed hot. It is possible to operate in this manner with an ordinary mixing machine that is not provided with cutting and scraping trowels, but generally it is preferable to employ a machine with a rubbing action to assist in the formation of a perfect mixture.

The problem of obtaining a perfectly homogeneous blend of all ingredients applies to any type of mixing job. The average mix is a composite of from six to fifteen ingredients, and the percentages of the separate materials vary widely. In cake mixes, for instance, individual leavening ingredients will run around 1 per cent, some flavoring materials may be present in amounts as low as 0.0025 per cent (25 parts per million), and in-



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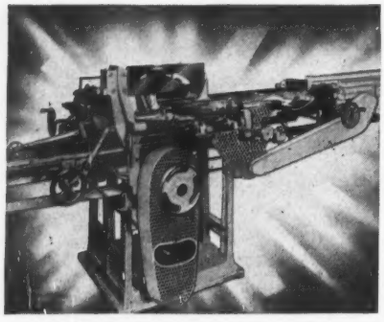

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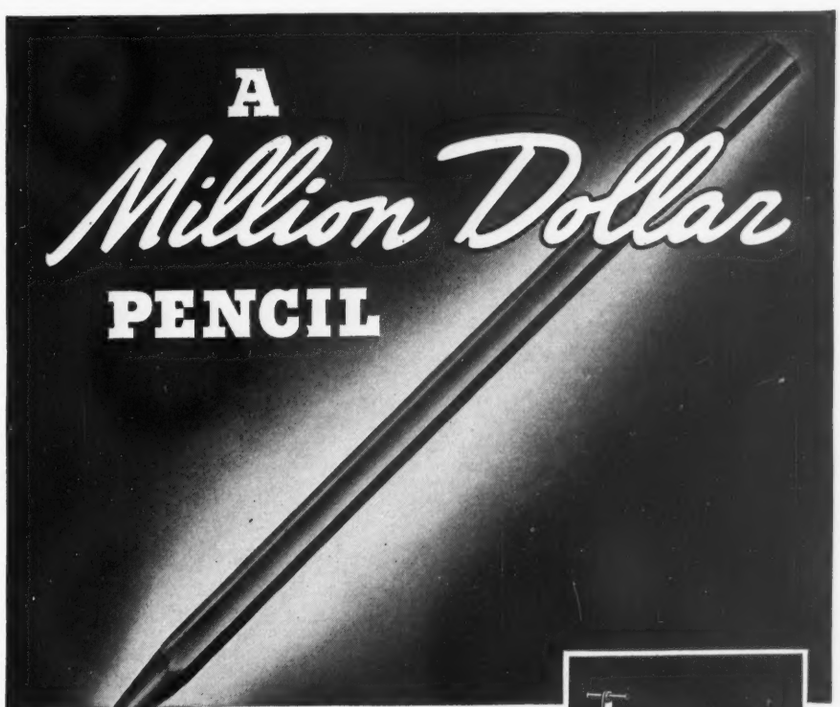
gredients such as flour or sugar may individually account for percentages around 30 to 50.

Some mix ingredients exhibit a peculiar tendency to stratify even when mixing is in progress. The mixing machinery must be scientifically designed so that no pockets or dead sections are formed, and care must be taken to specify correct mixing times and the right order of addition of ingredients. Usually, preliminary batches consisting of all the low-percentage ingredients and portions of one or more of the abundant materials must be made in small machines, and then this mixture is blended into the main mass of the mix in the large machine. This has been found to be the only satisfactory method of obtaining perfect distribution of certain low-percentage ingredients.

A constant check on the operators of mixing machinery must be kept to avoid the disastrous possibility of their leaving out an essential ingredient. Experience teaches that even the best men are not error-proof. The monotony of constant weighing and measuring produces lapses of mental alertness that will sometimes cause a man entirely to overlook the addition of an essential ingredient. The omission of some low-percentage ingredient will not change the physical characteristics or the total weight of a batch sufficiently for later handlers, such as packaging workers, to detect the mistake. So if there is no sure control, there is actual danger of an incompleted mix getting out of the plant and into distribution.

P. Duff & Sons guards against this danger by a complicated system of check sheets and test bakings. A check sheet is supplied to the operator of every mixing process and consists of a tabulation of the materials going into his mixing job. Spaces are provided for numbering each batch as it is begun and for the placing of a check mark under each separate ingredient as it is added to the mixer. Special tables or wall desks are provided for these sheets as near as possible to the opening through which the operator dumps his materials. At all times the check sheets must tell the exact degree of completion of each batch. As an additional safeguard, a sample of each completed mix is delivered to the laboratory and a full-sized baking is made. This detects errors in mixing and generally controls the quality and uniformity of each batch.

Mixes in progress through manufacture and packaging must be rigorously guarded against insect infestation. Nearly every mix contains ingredients which may attract several varieties of beetles and moths. The best methods of avoiding trouble with infestation consist of giving close scrutiny to raw materials as sources of contamination and of maintaining absolute plant cleanliness. Fumigation of finished product may be resorted to, but should not be necessary if care is exercised. A system of periodic plant inspections coupled with sprayings with a pyrethrum insecticide should be employed. The need for protection against insects extends beyond the manufacturing plant. The mix package must be insect-proof to avoid contamination along the line between manufacturer and consumer. The usual varieties of flour beetles and moths possess the power of penetrating packages of this sort, either by taking advantage of natural openings or by boring. Tin cans or cartons wrapped in metal foil are satisfactory in this respect.



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Food Technology

(*Continued from page 647*)

mentation can be achieved either by supplying fresh disastase in such quantity as to give the desired effect, or by means of an activator comprising, for example, yeast which has been liquefied in toluene. Residual sugar in the beer is thus fermented and little or none is left.

Digest from "Diastatic After-Fermentation in Brewing (Low-Sugar Beers)," by Dr. Silbereisen, *Chemiker-Zeitung* 62, 573, 1938 (Published in Germany).

CANNED FOODS

Canned Foods a Century Ago

ANYONE who is interested in the prior art of preservation by canning will find this a scholarly treatise on the early days of canning in England. The canning of meats for the British Navy was quite successful until about 1845 when spoilage problems began to appear, due apparently to the trend toward cans that were so large that adequate sterilization was impossible. In 1846 the firm of Goldner offered meats in canisters containing from 1 lb. to 500 lb. each! Cans containing from 9 to 32 lb. of meat were common, but spoilage in the sizes over 6 lb. each was excessive. In 1850 the Royal William Yard of the British Navy condemned no less than 111,108 lb. of spoiled canned meat.

Digest from "The Examination of Some Tinned Foods of Historic Interest, Part I, Historical Introduction," by J. C. Drummond and W. R. Lewis, *Chemistry and Industry* 57, 808, 1938 (Published in England).

Paging . . .

MR. E. NORMOUS BAKER

If you believed that Kemp firing 100 per-cent premixed gas and air would radically improve your oven efficiency, or minimize human attention and human error, or cut fuel bills . . . you'd certainly check into it, wouldn't you?

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DAIRY PRODUCTS

Determining Foreign Matter in Cheese

THE AMOUNT of foreign matter in cheese—flies, cockroaches, human or cow hairs, broom splints, brush hairs, cloth, copper and wood splinters, and what not—can be readily determined by a new test. This consists of putting cheese through a kitchen meat grinder without the usual cutting knife, then dissolving 100 grams of the ground cheese in 200 cubic centimeters of a water solution of sodium citrate (150 grams in 1 liter of solution). This is held in a water bath at 140 deg. F. for fifteen minutes, and stirred with an electric stirrer at 1,000 revolutions per minute. Then 100 cubic centimenters of water and 100 cubic centimeters more of sodium citrate solution are added and the stirring is continued until the cheese is dissolved. The solution is put through a sediment tester with the disk placed smooth-side up. The material on the disk can be identified by a low power microscope.

Current cheese dissolves more slowly than aged, but can if necessary be soaked over night. The solution will not change the appearance of the extraneous matter, leaving it readily identifiable. As might be expected, cheese with much "sediment" grades lower, since "sediment" indicates lack of care in manufacture.

Digest from "A Test for Extraneous Matter in Cheese," by D. W. Spicer and Walter V. Price, *Journal of Dairy Science*, 21, 1, 1938.

How Butter Differs From Margarine

ORDINARY SALTED BUTTER, containing about 83 per cent fat, 14 per cent water, 2 per cent salt and small amounts of protein, milk sugar, acids and lecithin, is chemically quite a different system from margarine, which varies in composition according to the oils used in making it. Margarine is, therefore, chemically a much more

complicated problem. It offers an important market for hardened oils, especially for hydro-genated whale oil, and for edible vegetable oils. The problem of salt as a preservative, for example, is complicated by the great variability of margarine, because very small amounts of certain metal ions reverse the favorable effect of salt by imparting to its properties which make it deleterious instead of beneficial. One result of this is "fishiness," a serious defect in margarine which must be prevented to avoid losses not only in material but in consumer confidence.

Another important property of margarine is its consistency, which has been found to be intimately related to the melting point range of the product. Components with wide range of melting points tend to make the product viscous and plastic. Others, especially coconut fat, tend toward a harder, more brittle consistency. This is a feature which needs attention in skilful blending of ingredients.

Analysts seeking to detect adulteration of butter with margarine have several reliable tests. Phytosterols reveal the presence of vegetable oils. A high content of isooleic acid, or a positive Tortelli-Jaffe test, reveals hardened whale oil. And comparative luminescence tests also give evidence of the presence or absence of margarine ingredients.

Digest from "Chemistry of Butter and Margarine," by L. Erlandsen, *Fette und Seifen* 45, 215, 1938. (Published in Germany).

DEHYDRATED FOODS

Pectin Protects Yeast During Drying

TOO RAPID removal of water during drying weakens yeast cells to the point of killing them. Previous practice in yeast drying has made use of such materials as dry starch or a nitrogenous colloid material such as gelatine to avoid destruction of the yeast during drying.

According to provisions covered by U.S. Patent No. 2,111,201 granted Harold Allden Auden, Banstead and Philip Eaglesfield, Sutton, England, pectins from apples and citrus fruits are particularly effective in protecting yeast cells during the drying operation and in maintaining baking strength of yeast during storage. The mucilage obtained by the water extraction of linseed is also effective.

These colloid materials, on a dry weight basis, may be added in amounts up to 10 per cent of the dry weight of the yeast, but as little as 4 per cent is sufficient. In dry form they may be mixed with the mass of pressed yeast, extruded, and dried for six hours at 30 deg. C. on a static dryer, down to 11 per cent moisture content. At the end of fifteen weeks of storage, the baking strength of the yeast is practically the same as when it was first dried.

In liquid form the pectin may be added to the yeast suspension coming from a yeast separator and passed to a drum dryer for partial removal of water at 30 deg. C. Final drying, done in a static dryer at 30 deg. C., leaves about 12 per cent moisture content which keeps the yeast cells at practically full strength during a storage period of seventeen weeks.

Addition of pectins and linseed mucilage does not interfere with eating or baking properties of the dried yeast. It is also noted that these products are tasteless.

The patent is assigned to Standard Brands, Inc., New York, N.Y.

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SPOILAGE losses from bacterial contamination will take an enormous toll of profits in many food plants during 1938. Have you taken steps to safeguard *your* products by means of a rigid sanitary routine coupled with a dependable, quick-acting sterilizer like Lo-Bax? This convenient germ-killer is so economical that you can use it everywhere—on equipment, containers, floors, walls, ceilings. Write us for full information.

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FLOUR MILLING

Conditioning Wheat

CONTRARY to the opinion of those who doubt the feasibility of prescribing in advance the optimum procedure for conditioning a given wheat, there are simple tests by which the procedure can be ascertained. Flour from the unconditioned wheat is first tested in the extensimeter and, from the basic course of the resulting extensogram, the optimum experimental temperature is ascertained. A sample of the wheat is treated at this temperature in the laboratory conditioner, then ground to flour from which a new extensogram reveals the correction which must be applied to the temperature derived from the first extensogram. Thus the operator learns the optimum temperature to be employed in the mill conditioner. The experiments were made at the Flour Physics Institute.

Digest from "Can Wheat be Conditioned by a Prearranged Procedure," by C. W. Brabender and G. Mueller, *Zeitschrift fur die gesamte Getreide, Mühlen-und Bäckereiwesen* 25, 95, 1938 (Published in Germany).

NEW! A Starch SPECIFICALLY FOR PIE FILLINGS!

(The *only* starch made expressly for this purpose)

- SETS to a smooth, creamy body—firm, yet free from lumps and graininess.
- TASTELESS—has no taste of its own to detract from that of your flavorings. Accordingly, your pies have better flavor.
- REMAINS TRANSLUCENT, considerably enhancing the eye-appeal of the pie or pastry.
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MEAT PRODUCTS

Paper Sausage Casings

ACCORDING TO a German invention, patented in England (British Patent 485,148, granted Aug. 4, 1938, to Wolff und Co. Kommandit-Ges. auf Aktien, Walsrode, Germany), a thin long fiber paper can be successfully employed for making artificial sausage skins. Tubing is formed by lapping the edges of a flat strip of the paper, and the seam is joined with a heat and water-resistant gelatin or glue, hardened with formaldehyde. The resulting tube is impregnated or coated by being passed through a gelatin solution. Before it passes out of this solution it is inflated, and after leaving the solution it is dried, passed through a formaldehyde solution to harden the gelatin, and dried again. The new sausage skins, besides being inexpensive, have some other advantages.

Liver Extract for Anemia

AN IMPROVED PROCEDURE for preparing a refined, potent liver extract for treating anemia involves recovery of the active principle from the crude extract by adsorption. As the invention is described in British Patent 473,064 (granted Nov. 4, 1937, to Basil D. Thornley, Bramhall, England), the crude aqueous or alcoholic extract from fresh liver is treated with a solid adsorbent (fuller's earth, bentonite, silica gel or activated charcoal) in neutral or faintly acid medium.

The active principle is then extracted from the solid adsorbent with a dilute alkali solution. For example, the extract from 11 lb. fresh chopped liver and 6 qt. of hot water is cooled and centrifuged, 1 per cent by volume of concentrated hydrochloric acid is then added to the filtrate, and the acidified extract is vigorously stirred with approximately 4 per cent (by weight) of fuller's earth. The fuller's earth is removed from the filtrate, washed three times with distilled water and suspended in a mixture of pyridine and aqueous methanol.

The pyridine, though not a strong base, imparts sufficient alkalinity for the purpose. A new extract, with the active liver principle in solution, is thus obtained. It is concentrated by vacuum evaporation, the remaining

pyridine is removed with ether and, if any protein remains, it is precipitated with alcohol. After this, the concentrated extract is filtered and reconcentrated.

RAW PRODUCE

Improved Fruit Packing

To DETECT WOUNDS in the skins of citrus fruits, immerse in Auramine (I.C.I.) solution and then wash and irradiate with ultra violet. The wounds fluoresce.

By using the foregoing test, or similar ones, it was possible to trace the source of abrasions and wounds in citrus fruit. Only 4 per cent of the fruits in one investigation escaped rind abrasions; 19 per cent of the wounding occured during picking; 34 per cent during transportation in field boxes; and 43 per cent occured in the packing shed. Fifty per cent of the wounds were of the rub type resulting from friction. These permit most rapid infection with molds.

Putting into effect some remedies suggested by the forgoing analyses resulted in a total decrease of 73 per cent in the number of fruits wounded.

Digest from "Eleventh Annual Report, Council for Scientific and Industrial Research," p. 58, 1937 (Published in Australia).

Spotting of Figs on the Market

FIGS, poorly refrigerated in shipping or held too long before sale, often develop a surface spotting which seriously affects their market value. This is due to a fungus growth, usually some variety of *Allemaria tenuis,* but with overripe figs, it is occasionally caused by *Cladosporium herbarum.* This defect is best prevented by precooling and refrigerated shipment. The rates of growth of the fungus at 32, 41, 59 and 77 deg. F. are in the ratio 1:3:9:18. If the car can not be precooled, fair protection can be obtained by putting in dry ice so as to get about a 23 per cent carbon dioxide concentration. Low humidities also prevent spotting but cause the figs to shrivel.

Digest from "Spotting of Figs on the Market," by Charles Brooks and L. P. McColloch, *Journal of Agricultural Research,* 56, 473, 1938.

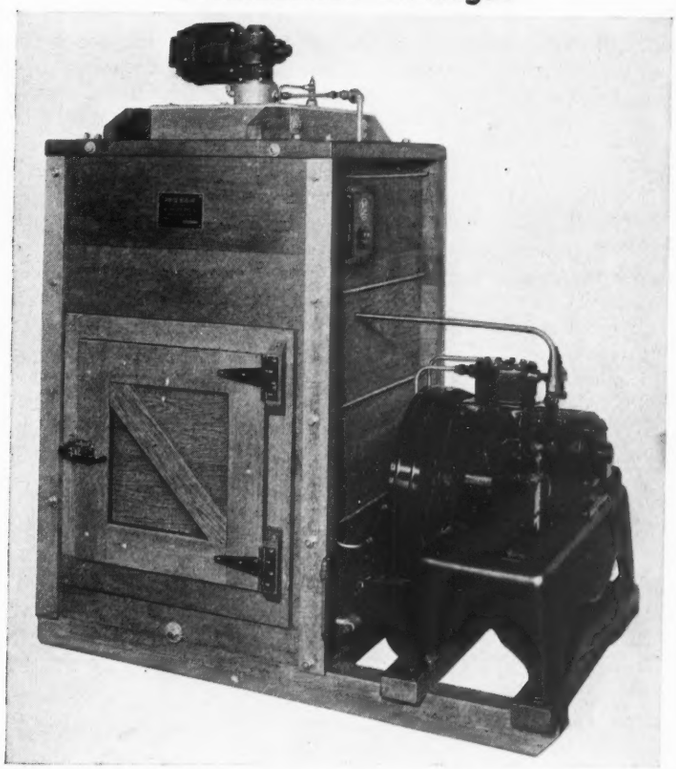
MISCELLANEOUS

Unripe Coffee Beans Lack Flavor

UNRIPE AND RIPE COFFEE BEANS from the same tree show sharp differences in their content of flavor principles (caffeine, protein, chlorogenic acid and sugar). Roasted unripe beans do not have the coffee flavor. They contain too much free potassium chlorogenate. Caffeine, the most important component, is not present in the free state in coffee but is in combination with potassium chlorogenate. This is why experiments with caffeine and its physiological effects cannot be directly compared with coffee and its effects on the human system. The excess potassium chlorogenate, present in the free state even in roasted coffee, has effects of its own which have not received enough attention. Flavor can be improved by freeing coffee of excess (free) potassium chlorogenate, but the treatment must not be carried so far as to destroy that portion which is combined with caffeine. A simple steam treatment suffices, and serves at the same time to make flavor milder by coagulating and partially decomposing the plasma.

Digest from "Results of Recent Coffee Studies," by W. Hoepfner, Communications, Tenth International Congress of Chemistry *Chimica e l'Industria* 20, 333, 1938 (Published in Italy).

New VILTER ½ ton
Pak-Ice Machine Produces Ice For You at *Tremendous Savings!*



FIRST *self-contained* ½ Ton capacity Icemaking Machine — complete with Compressor Unit and Storage Bin. Efficient, economical, compact, only 3 ft. wide, 5 ft. long, and 6½ ft. high!
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Please send us more details on Ice Savings and greater convenience, with the sensational new Vilter ½ Ton PakIcer. Also information on PakIcer Equipment for the following Daily Ice Requirements:
..... 1 ton per day ..... 2½ tons per day
..... 5 tons per day ..... tons per day
Name .....
Address .....
City ..... State.....

BOOKS RECEIVED

STRUCTURAL ALUMINUM HANDBOOK. Published by Aluminum Company of America, 1856 Gulf Bldg., Pittsburgh, Pa., 1938. 196 Pages; 5¾x8½ in.; cloth. Price $1.25.

Here is a book that belongs on the must list of every food engineer who wants data on the materials of construction available to his industry. In addition to information on the physical and mechanical properties of aluminum and on its manufacture and fabrication, the little handbook discusses the design of aluminum-alloy structures, covering the selection of working stresses, design considerations and beam formulas. Then there are more than 50 pages of data on the elements of various structural shapes, followed by technical data on miscellaneous structural products, specifications, tolerances and commercial sizes of structural material, conversion tables and other useful data.

This is the second edition of the handbook, published to include a considerable amount of new information developed since the first edition.

MILK BOTTLE LOSSES AND WAYS TO REDUCE THEM. Circular No. 469. By C. E. Clement, Bureau of Dairy Industry. Published by U.S. Department of Agriculture, Washington, D.C., 1938. 38 pages; 5¾x9¼ in.

In one year (1935) more than three hundred million milk bottles were manufactured, most of them apparently being used by milk dealers to replace lost or broken bottles. Which shows the importance to the dairy industry of curtailing such losses. This circular discusses the various systems used by milk dealers, such as pooling the bottles, charging bottles to driver, the commission system, the store bottle, the milk bottle exchange and the prevention of the misuse of milk bottles, cans and crates.

MULTIPLE MANAGEMENT. By Charles P. McCormick. Published by Harper & Bros., 49 E. 33d St., New York, 1938. 175 pages; 8⅛x5½ in.; boards. Price $2.

Two of the most pressing problems of business are the development and maintenance of cooperation within a business or industrial organization and the development of replacements or reserves, ready to step into the places of executives, factory heads or sales managers who retire or resign, without loss of efficiency to the organization. McCormick & Co., noted food manufacturer of Baltimore, has developed a means of successfully doing these two things. The system used there also has an added advantage in that it stimulates all concerned to the fullest use of their faculties in behalf of the business.

This book, by the president of the company, described the system employed and recounts several years of experience under its operation.

PATENTS

Powdered Food Products Made to Contain Milk Sugar in Stable Form—David D. Peebles, Eureka, Calif. No. 2,126,807. Aug. 16, 1938.

Pectin in Finely Divided Particle Form Dispersed by Coming in Mechanical Contact With a Divergent Stream of Liquid—George W. Mullen, Flushing, N. Y. No. 2,126,911. Aug. 16, 1938.

Citrus Fruits Steam Treated to Soften and Explode Pulp Cells and to Invert Sucrose Preparatory to Addition of Dietary Minerals in Stock Food Manufacture—Emory L. Cocke, Atlanta, Ga. No. 2,126,947. Aug. 16, 1938.

Fresh Fruits and Vegetables Subjected to Hypochlorous Acid Gas for Protection Against Mold Decay—Jatindra N. Guha, Los Angeles, Calif. to Hazara S. Hateshi, Los Angeles, Calif. No. 2,126,958. Aug. 16, 1938.

Perishables Protected Against Temperature Changes by Wrapping in a Heavily Creped Sheet Having a Centrally Located Pad of Thin Cellulose Crepe—William A. Hermanson, Roxbury, Mass. No. 2,127,029. Aug. 16, 1938.

Dextrine Made From Starch by Treating with Ammonia Compounds, Heating to 100 Deg. C. for Liberation of Ammonia and Finally Heating to Temperature of 180 to 200 Deg. C.—John E. Clegg, Hempstead, and Frederick C. Hilliard, Setauket, N. Y. to Arabol Manufacturing Co., New York, N. Y. No. 2,127,205. Aug. 16, 1938.

Cheese Protected Against Oiling Off or Leakage of Butterfat by Separating and Homogenizing Cream at Pasteurization Temperatures Preliminary to Addition of Skim Milk and Making Into Cheese—Harry L. Wilson, Chevy Chase, Md., and William T. Johnson, Jr., Arlington, Va., to the People of the United States of America. No. 2,127,453. Aug. 16, 1938.

Milk Treated With Organic Acid to Convert Portion of Sugar Content to Invert Sugar and Then Emulsify Preliminary to Spray Drying—Ninni Maria Kronberg, Rydsgard, Sweden. No. 2,127,524. Aug. 23, 1938.

Pie Crust Perforated by Mechanical Means—Eugene Vinzent Panther, Baltimore, Md., one-half to John H. Miller, Baltimore, Md. No. 2,127,651. Aug. 23, 1938.

Fat Containing Free-Fatty Acids Hydrogenated in the Presence of a Catalyst at a Temperature of 80 to 120 Deg. C. at Pressure of 25 Atmospheres of Hydrogen—Otto Brücke, Hochspeyer, Germany, to American Lurgi Corp., New York, N. Y. No. 2,127,716. Aug. 23, 1938.

Oatmeal Cooked in Water After Sealing in Cans—Edgar R. McShane, Baltimore, Md. No. 2,127,782. Aug. 23, 1938.

Egg Whites Mixed With Glucose to Prevent Souring When Treated With Lactic or Tartaric Acid Preliminary to Drying—Samuel Trannin, Kansas City, Mo. No. 2,127,945. Aug. 23, 1938.

Frozen Foods Displayed and Stored in Refrigerated Cabinet With Non-Frosting Windows—Virgil P. Warren, Atlanta, Ga. No. 2,128,386. Aug. 30, 1938.

Beverages Freed From Iron Cloudiness by Use of Purified Alpha Cellulose Containing Absorbed Hydroxyl Groups—William D. Ramage, Berkeley, Calif. No. 2,128,432. Aug. 30, 1938.

Cream With 19 to 40 Per Cent Fat Content Increased in Viscosity by Addition of an Acid and Heat Treating to Near Boiled Temperature at Higher Than Atmospheric Pressure—Anna L. Steckelberg, Plymouth, Nebr. and Jean Broadhurst, New York, N. Y. No. 2,128,565. Aug. 30, 1938.

Invertase Solution Made to Contain not More Than 30 Per Cent by Weight of Diacetin—Edward Romer Dawson, Epson, England to The Distillers Co., Ltd. Edinburgh, Scotland. No. 2,128,605. Aug. 30, 1938.

Meat Defrosted During Passage Along Horizontal Vat Provided with a Return Flow Compartment For the Defrosting Water—George A. Hormel to George A. Hormel & Co., Austin, Minn. No. 2,128,728. Aug. 30, 1938.

Cheese Grated by a Manually Operated Mechanical Means—Anthony Berarducci, McKeesport, Pa. No. 2,128,792. Aug. 30, 1938.

Vitamin Products Made From Whey From Which Lactose Has Been Removed Through Fermentation—Robert P. Myers and Samuel M. Weisberg, Baltimore, Md. to Sealtest System Laboratories, Inc. New York, N. Y. No. 2,128,845. Aug. 30, 1938.

Pecans Cracked by Mechanical Means—Leo J. Meyer, St. Louis, Mo. one-third to John A. Schuler, St. Louis, Mo. and two-thirds to The Champion Pecan Machine Co., San Antonio, Tex. No. 2,128,874. Aug. 30, 1938.

Dates Separated From an Agglomerated Mass by Subjection to High Vacuum and Steaming—Frank B. Doyle, Phillipsburg, N. J. to Guardite Corp., Chicago, Ill. No. 2,128,919. Sept. 6, 1938.

Soya Oil Stabilized by Glyceride Treatment Preliminary to Heating—Albert K. Epstein, Chicago, Ill. Nos. 2,128,925; 2,128,926; 2,128,927. Sept. 6, 1938.

Poultry Seasoned by Injection of Seasoning Liquid Into Flesh Immediately After Killing Before Body Cools—Joseph Mareta, Marseilles, Ill. No. 2,128,952. Sept. 6, 1938.

Fruits Treated With a Self-Emulsifying Protective Coating—Wendell H. Tisdale, Cleveland Heights, Ohio and Albert L. Flenner, Wilmington, Del. to E. I. du Pont de Nemours & Co., Wilmington, Del. No. 2,128,973. Sept. 6, 1938.

Sticks Inserted Into Frozen Confections in Plurality Quantities by Mechanical Means—Edwin L. Elwell, Baltimore, Md. to Eskimo Pie Corp. Brooklyn, N. Y. No. 2,128,992. Sept. 6, 1938.

Smoke Flavoring Condiment Made From Wood Distillation Liquor—Saladine E. Colgin, Dallas, Tex. No. 2,129,047. Sept. 6, 1938.

Soluble Protein Powder Prepared From Whey—Abraham Leviton, Washington, D. C. to Secretary of Agriculture of the United States of America. No. 2,129,222. Sept. 6, 1938.

Bacon Freed From Rind by Manually-Operated Mechanical Means—Lloyd J. Perrin, to Oran Heath, Casper, Wyo. No. 2,129,234. Sept. 6, 1938.

Butter Fat in Cream Determined by Method Giving a Clear Cut Reader Line at Top and Bottom of Cream Fat Column in Babcock Tester Bottle—Ronald E. Wood, Moscow, Idaho. No. 2,129,516. Sept. 6, 1938.

Foods Rapidly Frozen in Hermetically Sealed Container Equipped With Heat Transmission Elements to Aid Rapid Freezing Throughout Contents of Container—William J. Finnegan, Hollywood, Calif. No. 2,129,572. Sept. 6, 1938.